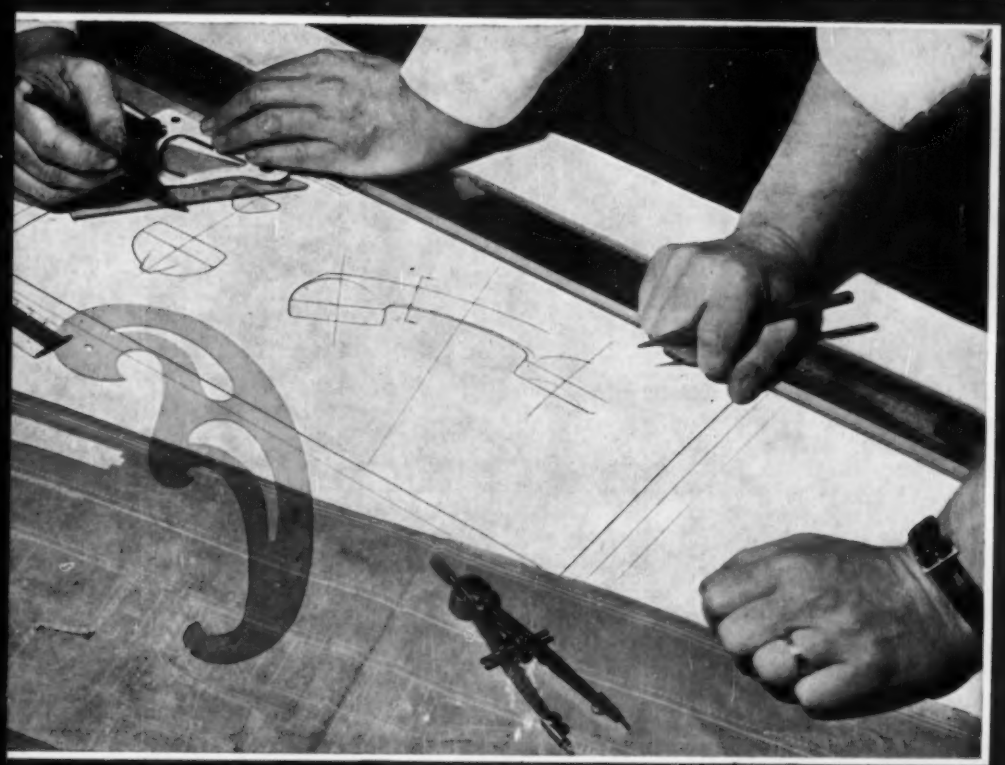
IAVE

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION



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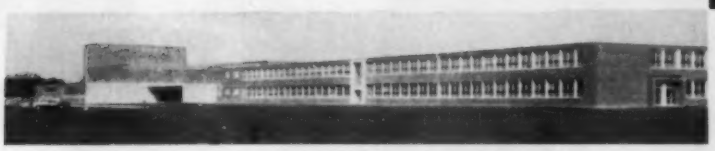

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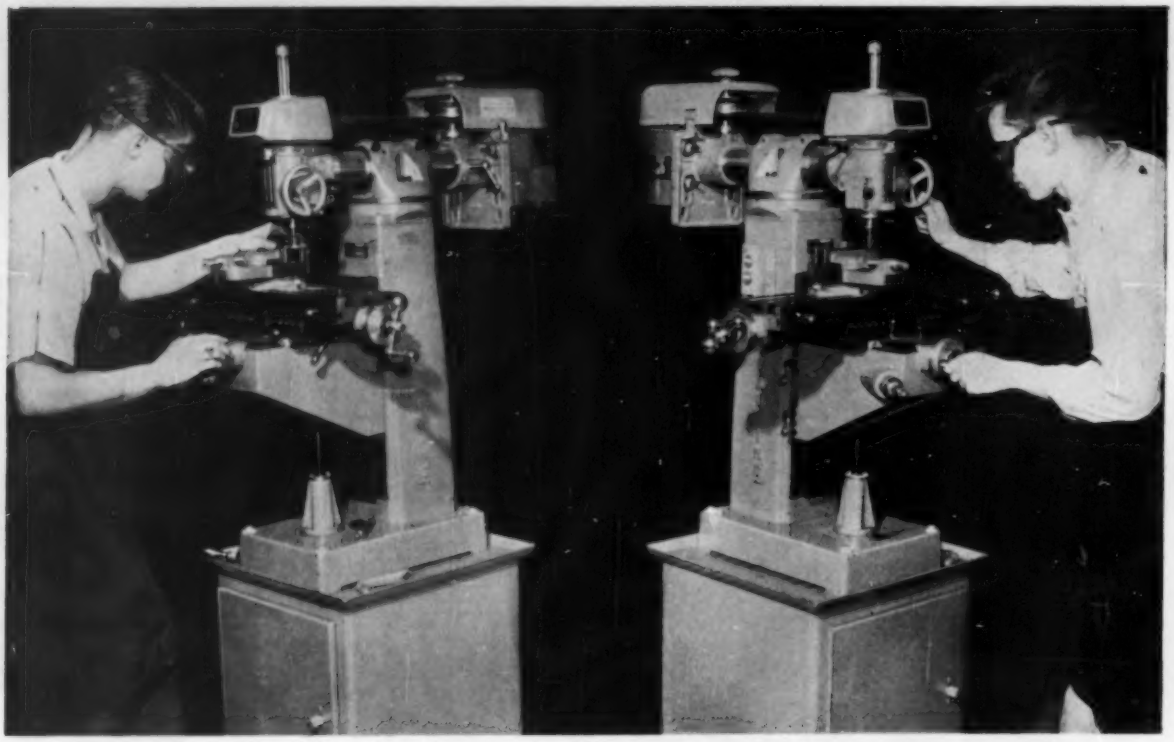

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Articles Indexed. — The Articles contained in the Magazine are indexed in "The Readers' Guide to Periodical Literature," and "Education Index."

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the bulletin board / news notes and trends in industrial education

N. Y. VOCATIONAL REPORT

The New York City board of education has issued a report on some aspects of the city's vocational high school program, presented during the board's weekly WNYC radio series, "The Superintendent's Report."

Dr. E. Frederick Pertsch, associate superintendent in charge of the high school division, in discussing "some of the more important aspects" of the program — facilities, enrollment, curriculum upgrading, etc. — stated that:

". . . Every report issued by departments of labor — both state and national — (indicate) there is a decreasing demand for unskilled workers and a mounting demand for skilled workers who can cope with expanding technological developments. It is the purpose of the vocational high school to prepare these skilled workers. . . . These schools are first of all, secondary schools aiming to provide a sound, general education. In addition, they aim to provide skilled workers to meet the manpower needs of industry in the metropolitan area."

HOW TO KEEP UP WITH TECHNOLOGY

Since modern technology, no longer limited to the province of engineering, affects every one of us, the industrial arts teacher has a responsibility of keeping abreast with technological developments. Especially is this true when considering the estimate that 50 per cent of the skilled and semiskilled workers of the future will require formal training for the jobs they will perform.

The April, 1959, *Texas Industrial Arts Association Bulletin* suggests ways for the i-a teacher to maintain technical competency in an era when new developments are occurring so rapidly. Each teacher should (1) develop a personal library of professional books; (2) build an industrial arts library, including a minimum of 10 books on each area being taught, and a minimum of 10 periodicals; (3) continue learning through graduate work or correspondence courses; (4) get on the mailing list for catalogs and new ideas; (5) take teacher-type field trips to build a knowledge of present techniques in industry; (6) strengthen themselves in science and mathematics; (7) look into summer employment in a given field to improve background; (8) make better use of people in the community in which you live; and (9) become a member of professional organizations and work actively in them.

RURAL VOC-ED IN TROUBLE

In a book recently released by the Department of Rural Education of the NEA and the American Vocational Association, *Vocational Education for Rural America*, the indictment is made that in most rural and village high schools vocational training is still held to be no more than agriculture courses for boys and home economics training for girls.

Vocational education, the authors of the report claim, is costly education and few

(Concluded on page 21A)

PROF. SAWDUST by Hanks

"In addition to these, I have a few observations of my own to make . . .

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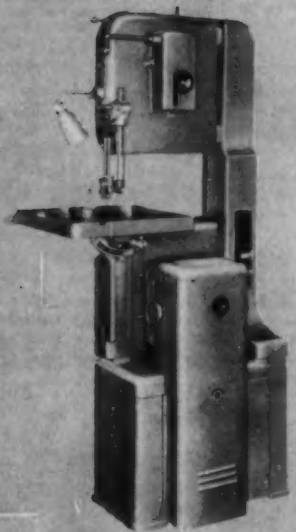

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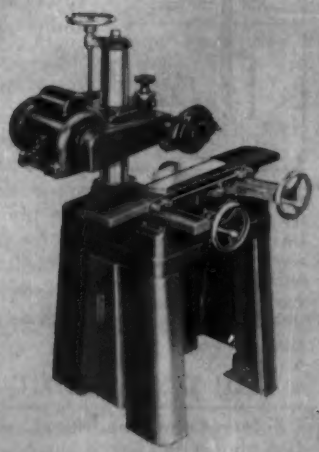

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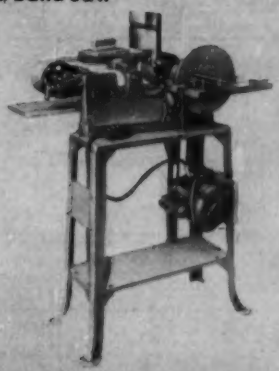

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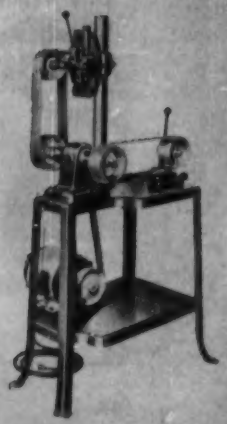

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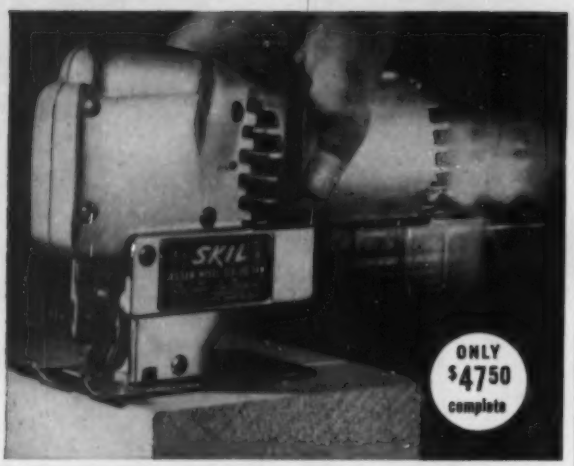

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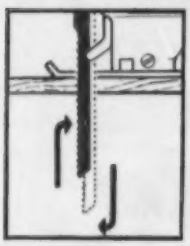

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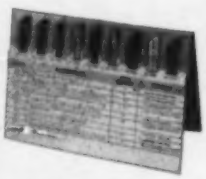

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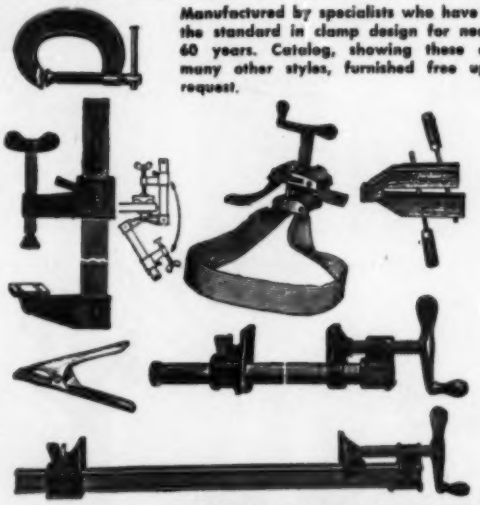

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The self-rating device, consisting of 77 objective-type items, surveys what is taught, where it is taught, how it is taught, and who does the teaching. The results of the survey can then be plotted on a profile chart to reveal both the strengths and the weaknesses in specific areas and in the over-all quality of the program.

For information on quantity orders, write College Science Publishers, P.O. Box 798, State College, Pa.

on planning for graphic arts

In addition to detailed information on Chandler and Price printing presses and paper cutters with clues on how to write specifications for printing equipment, this publication (36 pages) has hints on how to lay out and rearrange your school printing department, how to determine equipment requirements, what floor space to allow for presses and cutters of various sizes, pica tables, proofreaders' marks, types of paper stock and ink, a graphic arts dictionary, shop layout, an ink trouble chart, the proper lay for the California job case, etc.

The "Graphic Arts Department" is available at $1 per copy from The Chandler and Price Company, 6000 Carnegie Avenue, Cleveland 3, Ohio.

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For your free copy of "The Story of the Redwood Lumber Industry," write the California Redwood Association, 576 Sacramento St., San Francisco 11, Calif.

what's ahead for technicians

"Your Opportunities in Industry as a Technician" briefly describes and illustrates the wide range of activities and career opportunities for technical specialists in all fields of industry. It also outlines the aptitudes and education which are required for these positions and gives some indication of the challenging possibilities for young people in this type of work.

Write for catalog No. 105, which is available free "in reasonable quantities" for teacher and classroom use from the Education Department, National Association of Manufacturers, 2 East 48th St., New York 17, N. Y.

inside a storage battery

Interestingly written and illustrated, "The Storage Battery, Its Fundamentals, Use and Maintenance" has 23 pages of data on how batteries work, how they are used, and how they should be maintained.

Available free from the Electric Storage Battery Company, P.O. Box 8109, Philadelphia 1, Pa.

nails for fabrication

The result of extensive packaging research — "an important aspect of wood container construction" — here's detailed discussion of many facts concerning "Nailing Better Wood Boxes and Crates": types and sizes of nails, how to nail a wood box, how to nail a wood crate, resistance of nails to direct and lateral forces, wood groups, etc.

Well illustrated, the booklet, written by L. O. Anderson of the Forest Products Laboratory, Forest Service, U. S. Department of Agriculture, contains related data on the principles of fabrication and fastening with nails that would be helpful to many teachers of woodworking.

Write the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., for Agriculture Handbook No. 160, 20 cents.

industrial fire safety

"A way to inject fun, color, and showmanship into your industrial safety program": that's how the National Safety Council describes its new, 96-page, illustrated booklet, "Showmanship in Safety." This second edition of the booklet has ideas for stunts, demonstrations, and promotion that will help build interest and create favorable attitudes toward fire safety, to go along with your program for general safety rule observation.

For information on prices, write the National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill.

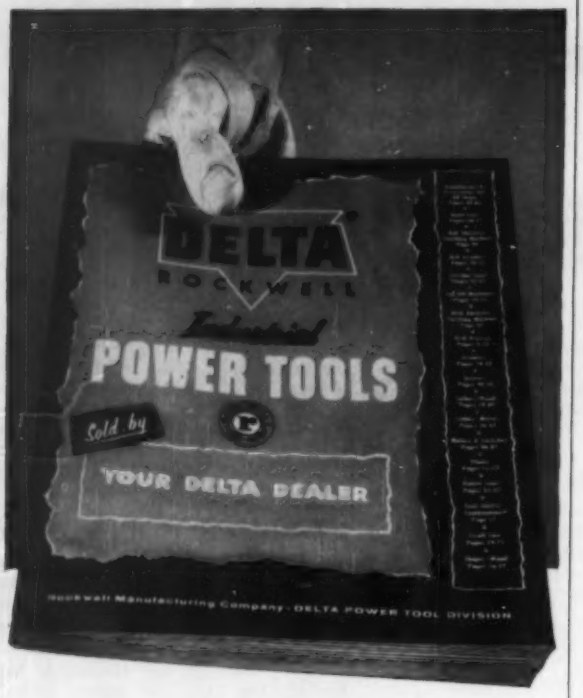
opportunities in drafting and design

The first in an Office of Education series designed to provide job information to help the states organize and operate courses of study in vocational education programs under title VIII of the NDEA, "Mechanical Drafting and Design Technology" also has pertinent data for local school situations on the (1) mechanical drafting and design field of work, (2) job descriptions of representative occupations in the field, (3) methods for determining the relationships between jobs in order to establish a cluster or group of related jobs, and (4) methods for determining the courses of study required to prepare students for a cluster or group of closely related occupations within this field.

Based on the premise that knowledge of jobs is fundamental to the planning of any occupational training program, this series in general and this booklet in particular offers most practical help in determining employment opportunities for highly skilled technicians in the labor market area, as well as some general understanding of the titles and duties of jobs and the training required in school for job performance.

In the particular area of drafting and design, this booklet discusses how drafting and design technicians are employed in ordinance production, power plant equipment, aircraft and missile production, electronics appliances and devices, computers and testing equipment, etc. Detailed descriptions of job function in these fields include those of the tool designer, steam turbine design technician, design checker, etc. Finally, training requirements in each of the above jobs are charted.

For information, write The Division of Public Documents, U. S. Government Printing Office, Washington 25, D. C.



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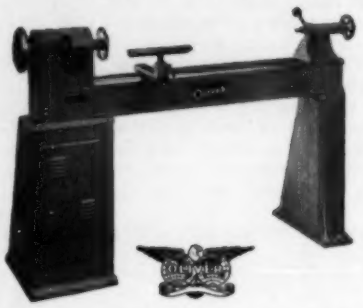

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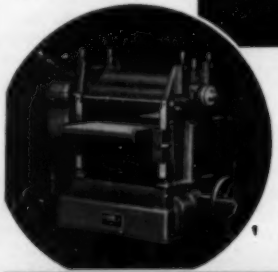

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This hand drill has enclosed gears for maximum safety, a solid handle and a chuck that cannot come off the spindle. Jaw springs protected.

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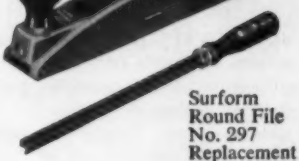
These replacement blades fit all above tools

No. 294B—regular cut, flat blade
No. 298B—regular cut, half-round blade
No. 394B—fine cut, flat blade
No. 398B—fine cut, half-round blade



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Especially designed for the school shop. The grinding attachment is for all chisels and plane irons up to 2⅛" wide. Equipped with "Fluid-Lite" Eye Shields that cannot be moved to non-guarding position.

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association / news

HIGHLIGHTS OF THE AVA CONVENTION

Dr. James B. Conant and Secretary of Labor James C. Mitchell will be featured speakers at the 1959 AVA Convention, December 7–11 at the Conrad Hilton hotel in Chicago in an appealing program outlined by M. D. Mobley, executive secretary of the association.

The first general session will be held Monday evening, December 7 with Dr. Conant, who recently completed The Carnegie study of American high schools, as keynoter.

Secretary of Labor Mitchell will speak at the banquet-dance to be held Wednesday evening, December 9.

"A Balanced Program of Trade and Industrial Education" will be the theme for the T and I division of the association. Such topics as "Industrial Arts in American Education"; "Planning, Problem Solving, Creative Expression and Experimentation in Industrial Arts"; "The Role of Guidance in Industrial Arts"; and "Industrial Arts for Girls and Women" will be discussed at the Industrial Arts division.

Special groups holding meetings at the time of the AVA convention, such as the National Association of State Directors of Vocational Education, American Technical Education Association, National Council of Local Administrators of Vocational Education and Practical Arts, etc., will hold their meetings prior to the formal AVA program. Divisional meetings of teacher groups, state supervisor groups, and teacher educator groups, and combined meetings will begin Tuesday morning, December 8, and continue through Thursday, December 10.

A preconvention program of the ATEA section will be held December 6, according to W. N. Fenninger, Delmar, N. Y., executive secretary of ATEA.

The program will include: Samuel L. Fick, Chief of the Bureau of Industrial Education at the State Department of Education in Sacramento, Calif., on "The Role of the State Supervisor in Developing Vocational and Technical Education Programs"; G. Ross Henninger, president of Ohio College of Applied Science in Cincinnati, Ohio, on "The Contribution of the Private Technical Institute"; and Frank E. Stewart, chairman of the Aeronautical and Physics department at Brooklyn Technical high school in Brooklyn, New York, on "The Contribution to the Public Technical High School."

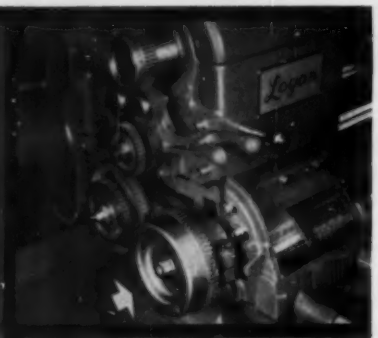
In addition, the Illinois Vocational Association will hold open meetings for all in attendance at the convention on Friday, December 11, in addition to sponsoring the banquet.

Finally this "53rd Annual Vocational and Practical Arts Convention" will display the largest single exhibit of equipment and supplies for vocational and industrial arts education.

new safety feature

Logan

Automatic Safety Gear now standard equipment on 10" and 11" models



12" Lathe

10" Lathe

All Logan 11", 12" and 14" lathes, as well as models 1825 and 1875 *(shown)* 10" lathes, now offer positive overload protection without additional cost. Exclusive Automatic Safety Gear absorbs shock of sudden overloads when threading, preventing gear damage from spindle to gear box. Also protects all gears in gear box up to 52 threads per inch. The combination of this Safety Gear and spring-loaded lever-operated clutch in apron gives the same protection for corresponding feeds. Can be factory-installed on other models of new 10" and 9" quick-change lathes. Available for present Logan quick-change lathes: $10 for 9", 10" and 11" sizes, $15 for 12" and 14".

For full model details and evidence of Logan's *low upkeep* and *better service*, see your Logan dealer, or write for catalog.

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JOB-SNOBS CONDEMNED AT IOWA STATE CONFERENCE

The job-snobbery of parents is robbing young people of needed technical training, Iowa Governor Herschel C. Loveless charged in a speech September 24 at the 33rd Annual State Conference for Local Supervisors, Co-ordinators, and Teachers of Vocational Trade and Industrial Education in Des Moines, Iowa, according to Dr. Robert Denny, administrative assistant to the superintendent of Des Moines, Iowa, schools.

Governor Loveless said, "I am afraid that we are still influenced by the archaic, snobbish idea that vocational education is not on an equal social plane with academic education. Many parents say that, 'Technical school training is all right for young Joe down the street from us — but not for our Johnny, who, as any fool can plainly see, has the brains to be a top executive or a professional man.'"

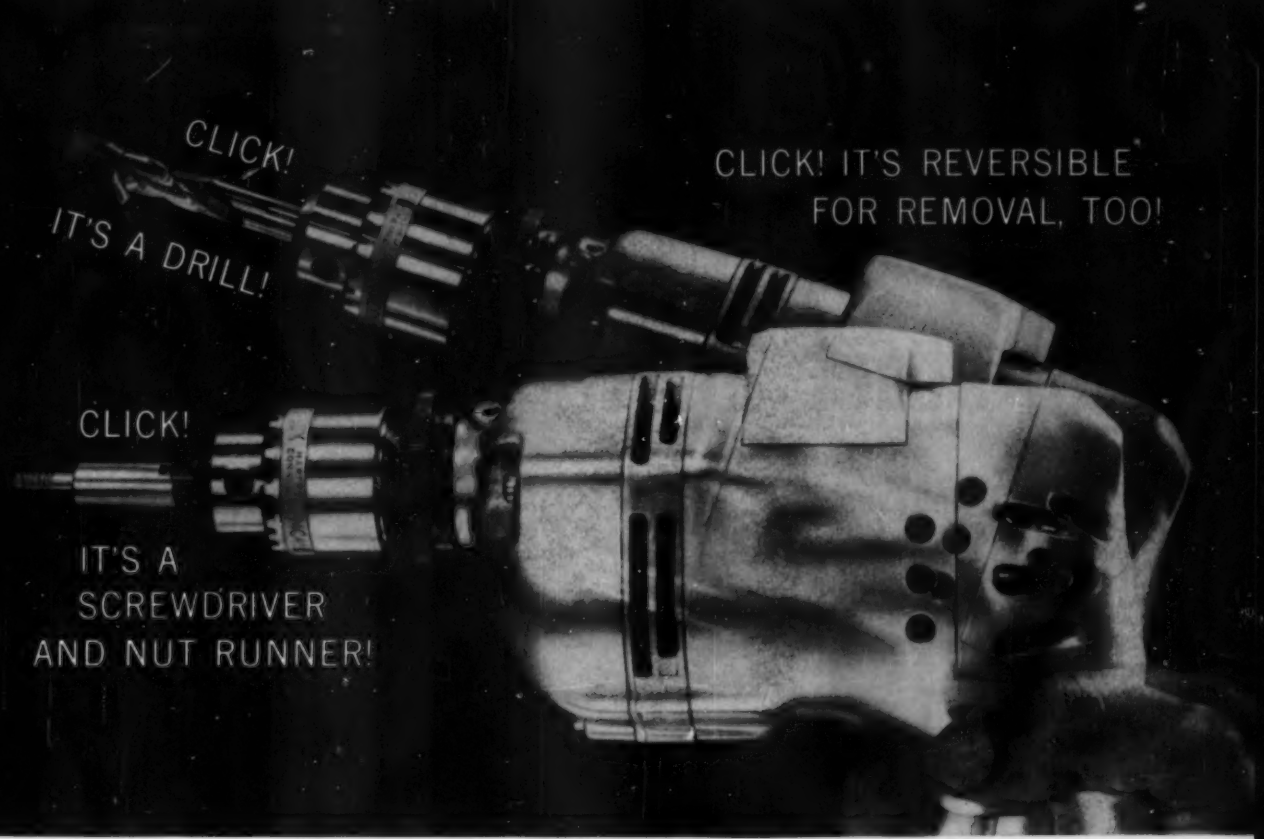
The annual state conference was held on September 24 and 25, 1959, at Hotel Kirkwood, Des Moines, Iowa. The theme of the meeting: How Can "Pursuit of Excellence" Be Accomplished in Industrial Education?

O. H. Beaty, state supervisor, trade and industrial education, was general chairman.

L. A. COUNTY INDUSTRIAL EDUCATION ASSOCIATION

The first meeting of the year of the Los Angeles County Industrial Education Association was held at El Camino College, Monday, October 19, and followed the usual format of the L.A.C.I.E.A. meetings. Beginning at 6:00 p.m., the extensive vocational shops of the college were inspected by the educators. Dinner in the college cafeteria followed, and the general meeting

(Concluded on page 22A)



Now, a powerful drill plus a screwdriver both in one tool...the NEW B&D 3/8" SCRU-DRILL

DRILL in metal or wood. Powerful B&D motor gives you full ¾" capacity in steel, ¾" in wood.

DRIVE screws, nuts or bolts with same tool. Handles #10x1½" wood screws #12 self-tapping.

REMOVE as many as 60 screws, nuts and bolts in 60 seconds. Just flip the reversing switch.

REVERSING switch is *piggy-back* mounted for convenience. You can flip it with your thumb.

Train them with the tools they'll find on the job.

Imagine! A simple turn of the wrist and you switch from drill to screwdriver. A flip of a switch and you're removing screws, nuts and bolts. Remove a bolt, oversize the hole, run a new bolt—as easy and fast as 1-2-3 *and all with the same tool*, your new Black & Decker ⅜" Reversible Scru-Drill!

Help your students prepare for their future with the tools used by modern shops and factories—train them with B&D Quality Electric Tools!

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Give your students a head start for the years ahead

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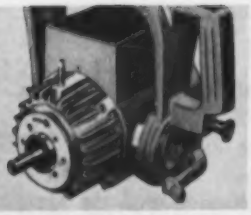
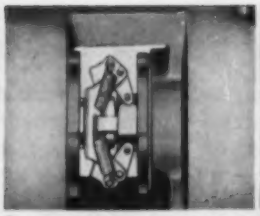
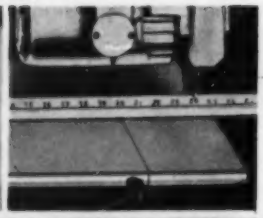
NEW 1030 DeWALT®



NEW! TOTALLY-ENCLOSED, DIRECT-DRIVE MOTOR, runs on 120/240 volts, AC.

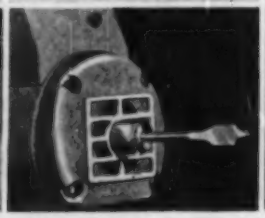


NEW! BUILT-IN ROTO-GRIP Brake, stops tools with electro-mechanical action.



NEW! DROP-LEAF SAF-T-TABLE up front protects operator on wide cuts. (optional)

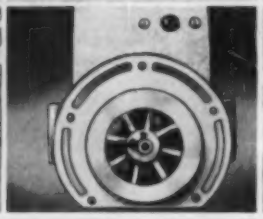
NEW! CUT-OFF SCALE on guide fence makes "repeat" cross-cuts easy.



NEW! DUAL-ARBOR MOTOR SHAFT uses right hand tools on back end arbor.

NEW! MOTOR TILTS FULL 360°, multiplies range of shop jobs, adds flexibility.

NEW! "CAM-TYPE" SAFETY KEY SWITCH, works in any direction, protects your students.



NEW! PATENTED COOLING SYSTEM pushes cool air through motor slots at 30 CFPM.

NEW! EXTRA BIG CAPACITY. 10" saw cuts 3" deep, rips over 24" wide on panel stock.

NOW...more than ever...you'll make DeWalt your No. 1 choice for industrial arts and vocational training. This new 1030 DeWalt brings still greater safety, versatility and accuracy plus other extras.

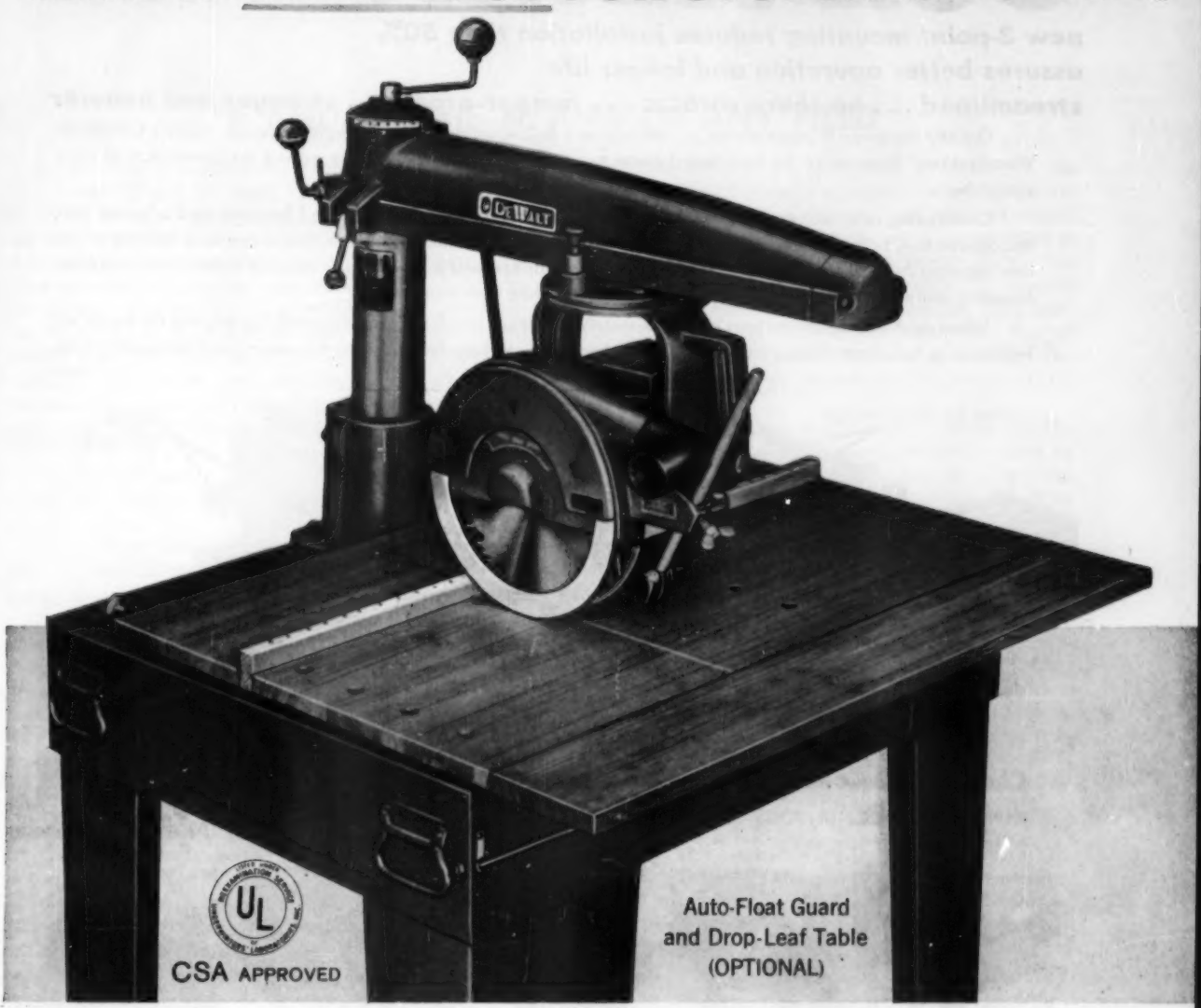
Plan now to include a 1030 DeWalt in your next purchase requisition. Here's a condensed specification guide:

- 10" saw, radial type, model 1030 DeWalt.
- Uniform cantilever arm rotates 360° around the column.
- All operating adjustments and set-ups above the work table.
- Grease-shielded ball bearing head rides on machined trackways inside arm.
- Totally-enclosed, direct-drive, fan-cooled motor delivers 3 H.P.
- Built-in, electro-mechanical brake.
- Cut-off, miter, bevel and rip scales.
- Safety "Cam-Type" key switch.
- 26"x34" steel base with welded handles and 4 detachable legs.
- Big 26"x36" work top with drop-leaf board.
- 10" saw and Auto-Float safety guard with exhaust nozzle and anti-kickback pawl.

(Specify electrical characteristics required)

Compare! See the new 1030 DeWalt demonstrated at your nearby dealer's store. Write for catalog, DeWalt, Dept. IA-912, Lancaster, Pa.

NEW DESIGN...NEW SAFETY...EXTRA POWER
MAKE IT EXTRA EASY FOR STUDENTS TO USE!



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CSA APPROVED

Auto-Float Guard
and Drop-Leaf Table
(OPTIONAL)

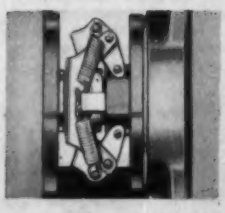
MODEL "1030" AMF DEWALT POWER SHOP*

*T. M. DeWalt Division

1st

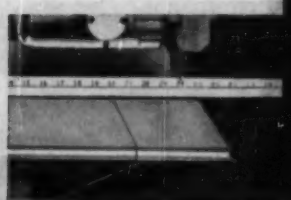
TOTALLY-ENCLOSED MOTOR
direct-drive delivers 3 H.P.
EXTRA POWER WHEN NEEDED!

1st



BUILT-IN ROTO-GRIP BRAKE
stops motor instantly
EXTRA SAFETY FOR STUDENTS!

1st



DROP-LEAF SAFETY TABLE
eliminates exposed saw up-front
EXTRA SAFETY FOR STUDENTS!

MODERN VISES FOR ALL OF TODAY'S NEEDS!

COLUMBIAN WOODWORKERS' VISES

new 3-point mounting reduces installation time 50%
assures better operation and longer life
streamlined . . . no sharp corners . . . tamper-proof . . . stronger and heavier

Greatly improved in appearance . . . entirely new in jaw, guide rod and mounting design, today's Columbian Woodworkers' Vises utilize the time-tested continuous screw mechanisms that have gained the preference of users everywhere.

Outstanding new feature is the exclusive 3-point mounting. Employing 2 slotted brackets and a center rest, this assures firm, tight vise mounting, ease of operation and longer life. Installation is reduced to a fraction of the time required by ordinary vises as the bench can be pre-drilled and bolts partially installed before vise is located. Mounting instructions and an accurate template are furnished with each vise.

When mounted, top of vise jaws is approximately ⅛" below bench top. Consequently, top edge of the bench will help to keep tools from striking metal jaws of vise. Bench top can be refinished without removing and remounting vises.

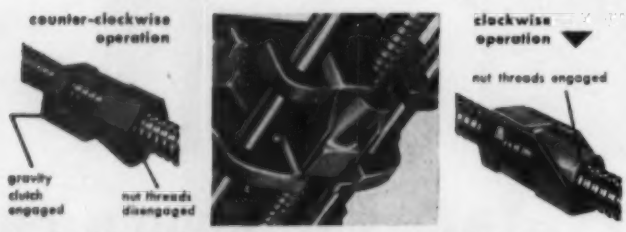
AA-8811

Drilled for Wood Facings
Choice of Dog Type or Plain Front Jaw
Hardwood Handle
tubular steel handle optional no extra cost
adjustable steel handle on 2 models
Slotted Mounting Brackets
Drag Bar
Streamlined No Sharp Corners
Guide Rods Hydraulically Pressed into One-Piece Jaw Assembly
Center Rest Holds Tight Against Bench
Cold Rolled Steel

Choice of 2 Continuous Screw Mechanisms

RAPID ACTING CONTINUOUS SCREW VISES

. . . for use where changes in jaw openings must be made frequently and fast!

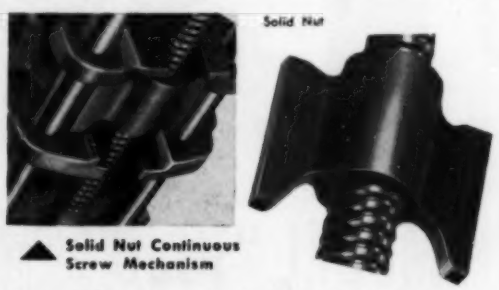


Rapid Acting "Power-Slide" Continuous Screw Mechanism

Key to superior operation is exclusive "Power-Slide" mechanism. This incorporates a gravity friction clutch which assures positive operation (no springs) and automatically compensates for wear. Counter-clockwise operation of screw disengages mechanism, facilitating "free sliding" adjustment of jaw opening. Clockwise operation of screw engages full 180° half-nut, producing continuous inward jaw movement and high pressure holding without slippage.

SOLID NUT CONTINUOUS SCREW VISES

. . . for general woodworking in industrial and school shops!



▲ **Solid Nut Continuous Screw Mechanism**

Heavy steel screw is made with double lead, fast running thread to provide maximum speed of operation. Solid Nut assures long, repair-free life.

2 models of Solid Nut Continuous Screw Vises are made with special Adjustable Steel Handles for extra fast operation.

Columbian Vises and Columbian Levels are sold by leading distributors everywhere.

COLUMBIAN
Vises **The Columbian Vise & Mfg. Co.**
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"R AND D," THE FUTURE OF ANY FIELD

Anyone who is a consistent reader of trade magazines knows that "R and D" stand for the two most important words in American industry. R and D, or Research and Development, form the basis for most of the outstanding achievements of our country's industries. Companies who show greatest progress and who market the largest number of new products are those which budget generously for research and development. Many of our outstanding growth companies pour back into research and development as much as ten per cent of their net incomes. A common story among the most active industries is that more than half of their new products are less than ten years old. Were it not for strong research and development programs, companies in the fields of electronics, drugs, and metal products, for example, would soon be out of business.

The average person takes for granted the need and value of research and development in industry. Professional people in other fields, such as the doctor, pharmaceutical worker, and dentist, must carefully follow new research in order to keep abreast. We are most critical of our professional people who fail to make use of the latest findings of research.

If these things are true in industry and the professions, why should not the same conditions exist in education, especially industrial education? Nevertheless, some professional leaders in the field of industrial education turn away from research. Industrial education teachers today number almost 50,000. Of this number close to a thousand work directly in teacher education. Yet our profession can boast of not one single full-time research worker.

Today, most curriculum development in industrial education is based solely on arm chair techniques. Decisions are made, questions answered, and policies established by our experts whose authority stems entirely from their opinions of what is good. There is a great need for determining these things by the far more accurate, authoritative, and conclusive methods of research. Industrial education greatly lacks efficient experimental research in the development of new curriculum ideas. Only by proper research can we hope to answer positively such questions as these:

1. What should we teach?
2. How should we teach it?
3. How are skills learned by students?
4. Under what conditions should we teach?
5. What is the best content to teach at each age-grade level?

These are but a few of the questions requiring honest answers.

The Congress of the United States has offered aid for research in education. For the 1960 fiscal year, over three million dollars has been made available. Of the almost 200 research projects approved under this governmental program, only two represent industrial education. The question might be asked, "Are we so unimportant in the total educational picture in the United States that we should command only one out of each 100 research projects?" There must be some reason for this small number of research efforts. Perhaps it is because we lack an adequate number of research workers or because educators in general have an indifferent attitude toward the values of research.

Until recently, research in the field of industrial education consisted largely of questionnaire studies done by master's and doctoral degree candidates. In most cases these were merely compilations of personal opinions. Most of our research today is done by the novice as a requirement for completion of an advanced degree. Once that individual has completed his research project, he usually makes no further use of the skills he has developed in research methods and statistical techniques. Once he gets his degree he is so occupied by his regular teaching assignment that he gives no further time to research. Even the limited research now available in industrial education is not used to any extent. While most recent doctoral theses are available on microfilm, there has been only minimum use of these materials.

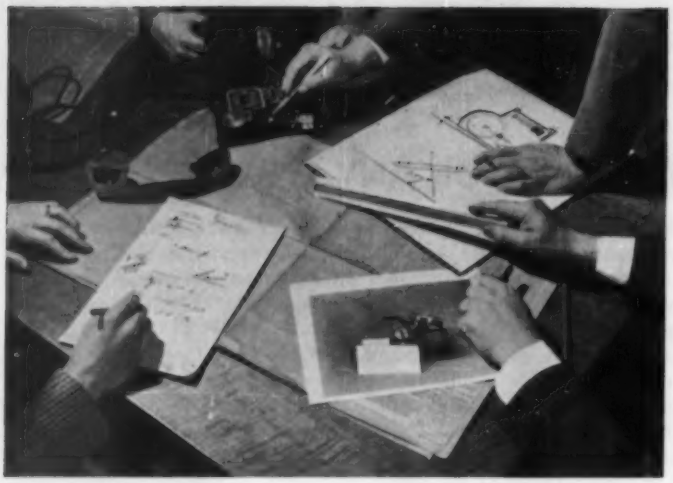
Since industrial education represents industry and industrial life, we cannot consider that we do an adequate job if we fail to base our work on adequate research and development. If we are to show proper growth as a profession, we must depend more on research and its results. It is time for us to give our support to research and development and to do what we can to establish a better research program in our field.

John L. Feirer

Dr. John L. Feirer has taken a year's leave of absence from his position as head of the Industrial Education Department at Western Michigan University, Kalamazoo, Michigan. He is spending the year at the University of Hawaii where he is helping to establish a new program of industrial arts teacher education in the 50th state. He will return to his regular position in Kalamazoo in September, 1960.

IA/VE has changed its policy in the matter of the editorship to be in line with other good professional magazines in education. Under this policy, an individual who holds a position in an educational institution is asked to serve as editor to prepare the editorials and to guide the over-all policies of the publication. The editorial staff is responsible for the home office activities in regard to the production of the magazine.

design



— Henry Dreyfuss Associates

▶ One of the **increasingly important** concerns in industrial education, design was listed as one of the three "cores of experience" in **The Minnesota Plan.**

▶ On the following pages are two fresh approaches to the subject: (1) a discussion of the **method of the industrial designer** with two case histories of his work and how his approach affects i-a teaching, and (2) a report on a survey rating various **procedures for teaching design.**

Method of the Industrial Designer

JERRY STREICHLER

Much interest has been focused on design in industrial arts in recent years.

Emphasis has been placed on principles of good design. Efforts have been made to develop criteria for evaluating good design. Methods have been suggested for overcoming teacher and student inertia in considering and applying design principles in industrial arts work. In much of this interest the influence of the industrial designer is apparent. Suggestions that the designer's products be studied as a basis for appraisal and determination of good design is evidence of his influence.

All this is extremely important. Development of critical judgment and aesthetic appreciation are accepted industrial arts objectives and are factors behind the recent interest in good design. Also, a variety of problem-solving methods related to design procedure have been suggested.

In much of the material which has been published on the subject of design in industrial arts education, however, the method and work of the industrial designer seems to have been neglected to a point of omission. The industrial designer's products have been analyzed and discussed, his proficiency in creating aesthetic and functional products has been subjected to critical review, but his method and his organized approach to product development have not been adequately publicized in industrial arts literature. It is the work of the industrial designer that, indeed, suggests a coherent problem-solving approach deserving consideration by industrial arts educators.

Analysis of the industrial designer's approach to product development reveals that he is concerned with many areas fundamental to industrial arts education. The industrial designer is that rare specimen in this age of specialization who utilizes a general body of knowledge and applies a variety of skills in his job of product development. It would be fairly accurate to say that the designer functions in an elaborate comprehensive general laboratory similar, in many ways, to the comprehensive industrial arts shop.

Case Histories in Design

Two summaries of design case histories which follow provide insight into the industrial designer's work. A number of factors in these case histories are important. They are: (1) the organized research, (2) the

Mr. Streichler is assistant professor of industrial arts at Montclair, N. J., State College, from where he received his M.A. He is a candidate for Ph.D. at New York University and is a member of EPT.

designer's knowledge of materials, (3) his knowledge and understanding of production and fabricating processes, (4) his use of two dimensional sketches and three dimensional models in clay, wood, plaster, plastic, and other materials as aids in the solution of his problem, and (5) his concern with good form within the limits of the manufacturing process and the materials most suitable to the product.

A Telephone

The No. 500 telephone was developed by a team including Bell Laboratories research engineers, Western Electric Company production engineers, and industrial designer Henry Dreyfuss.

The design of the No. 500 set posed a series of problems. The handset had to fit the mouth to ear dimensions of all who would use it. A problem unique to telephony, that of the receiver not being properly replaced, had to be overcome. The dial required reworking to provide accuracy and speed in locating numbers and to preclude finger slippage.

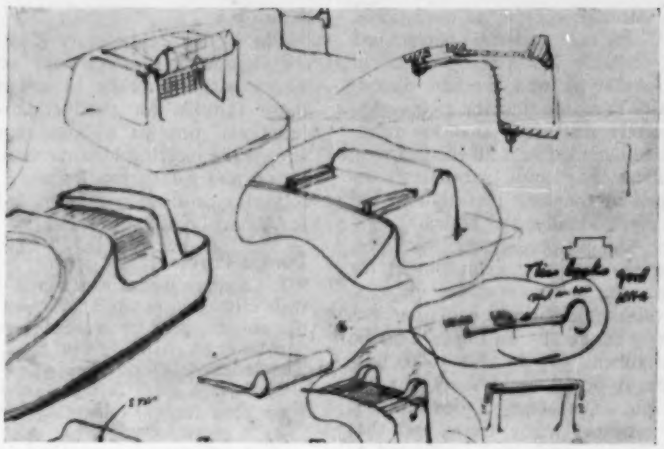
The relationship of the housing to the internal mechanism of the base had to meet requirements of efficient and speedy production assembly while allowing quick internal access for servicing. The aesthetic factor weighed heavily, for the telephone had to ". . . look equally well in home, office, and factory, in elegant or humble surroundings. The same telephone design is used in the White House, a corporation office, or the home of a farmer."[1]

These are typical of the many factors considered in the design of the No. 500 telephone. Many other problems were worked out during the 2200 man hours expended in design development and drawing, and the 1300 hours spent in producing preliminary clay models.

The designer followed an organized approach in attacking the telephone design problem. In consultation with representatives from Bell Laboratories and Western Electric Company, limiting factors were established. As soon as practicable, rough sketches were produced to aid discussion, visualization, and problem definition. When an idea seemed acceptable, a three dimensional model in an appropriate material was made, studied, and modified. As the problem neared the final stages of development, the telephone was rendered in a material whose finish duplicated that of the mass-produced product.

The next step in design was fabri-

[1]Don Wallance, *Shaping America's Products* (New York: Reinhold Publishing Corp., 1956), p. 37.



In designing the new telephone a design team of Henry Dreyfuss Associates analyzed the earlier model, as shown on the facing page and then defined the problem with rough sketches.

The approved design is sketched in clay.

After wood and plaster models are made of the handset, a wood model is made of the base. After the engineering drawings are finished, the new models are presented to management and the design problem is solved.

cation of a prototype, an operational model in the material determined most suitable for mass production. The prototype was checked dimensionally to assure that the molds were accurately made and that the product had included in it all the changes, modifications, and subtleties developed in the long gestation period of design. Finally, the No. 500 telephone and its predecessor were presented to company management for comparison and acceptance.

Over-simplification can be extremely dangerous. In the case of the development of the No. 500 telephone, it would be foolhardy to forget that each stage of development was repeated many times and that intensive research was conducted to determine a material which would be light, strong, and lend itself to mass production. Much investigation was necessary before a product meeting all aesthetic and functional requirements could be developed.

Western Electric Company has recently been advertising a telephone with provisions for push button dialing in the hand set. The company cautiously points out that the model pictured may be the telephone of the future. It is safe to assume that the telephone depicted is only a stage in the design of a successor to the No. 500 set. Undoubtedly, many drawings, models, and prototypes will be made before a new telephone meeting the standards of designers, research engineers, and production engineers is produced.

A Lamp

The second case history illustrates the designer's research and experiments with materials to determine those suitable for production of a functional product of good appearance while meeting existing manufacturing and safety requirements. The following outline was provided by Raymond Loewy Associates.

Design Problem:

I. Client requested a design to house their existing ultra violet, infra-red lamp element to produce a readily-salable, popular-price gift and travel item.
The design was to provide:

a) Storage space for the cord set
b) Some form of folding support
c) A concealed switch
d) A reflecting area of Alzac (a relatively soft, high purity aluminum alloy) to focus the lamp rays in an area of 18 by 30 in. at a distance of 30 in. from the Hanovia "Bahamas" lamp.

II. Basic design was concerned with the size of the existing lamp element and the parabolic shape of the reflector required to give the specified reflection.

a) Design began with a study of the element itself.

b) It was decided to split the Alzac reflector surface into two equal halves, hinged to the element body in such a manner as to provide a protective cover for the lamp element when closed.

The Loewy designers found that Alzac aluminum was not suitable as both a reflector and an exterior cover. Laboratory tests further indicated that a minimum of ¼-in. air space would be necessary between the Alzac reflector and the exterior cover to provide the necessary thermal insulation.

Consequently, they investigated the possibilities of using: thermo-setting plastics as a covering between the ¼-in. insulating air space and the reflector doors; plastic material for economy, color, variety, and style possibilities. Insulating requirements in local areas, however, proved to be higher than could be obtained with plastics.

Finally, the designers selected die cast aluminum which was tested and proved to be a satisfactory material to hold the Alzac reflectors and still provide the required strength, lightness, and resistance to high temperatures.

III. With the reflectors contained in aluminum doors a latch was necessary to provide a positive open and close. It was decided to incorporate the door latch into a simple wire guard that would also serve as an opening and closing device for the unit doors. The latch, mounted on the wire guard, would also meet the Underwriters Laboratory requirements that all high temperature appliances have a protective guard to prevent the element from coming in contact with fabrics, or other inflammable materials.

IV. A space behind the element was created to form a box-like cavity designed to contain the cord set and lamp switch.

V. The cover for the back cavity was designed and hinged to form the pivot leg of a tripod lamp support at table position. The other two legs of the tripod support were skew-mounted to provide a three point support when open and to fold flat inside the cover when closed.

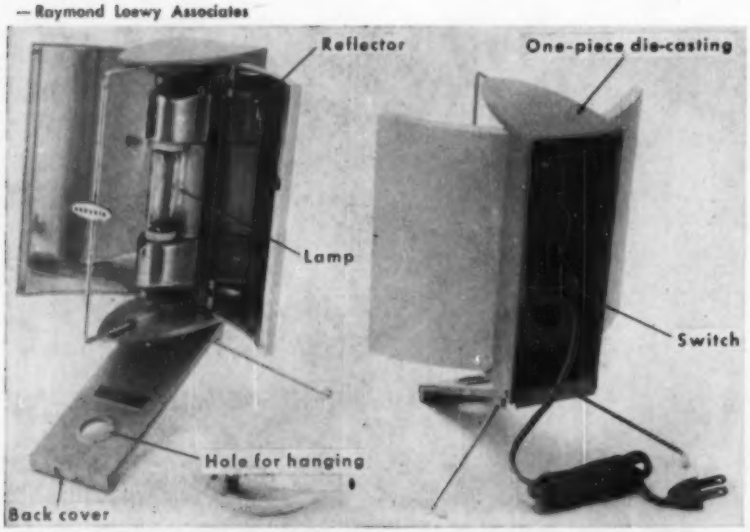
A friction fit on a nylon button gave positive closing and easy opening. The 7/8-in. diameter hole in the rear cover allows for easy opening with one finger and also provides a place from which the lamp may be hung.

VI. The main body of the case, including element support, cord set cavity, and extension wings to mate with the reflector doors, was designed as a one-piece aluminum die casting. Aluminum (also used for the reflector doors and rear cover) met the same requirements for lightness, strength, and thermal resistance. A textured, vinyl spray, "Armahide," was chosen to meet the heat resisting requirements and give an attractive finish.

VII. The wire legs are chrome-plated steel. The legs are tipped with nylon feet. A die cast oval catch attached to the wire safety guard provides an easy finger grip and an easily visible spot for the Hanovia trade name.

VIII. The entire unit weighing 2 lb. 5 oz. when in the open position has its center of gravity located forward of the support legs so that the lamp can only fall backward with the lamp element pointed up, to provide an additional safety factor.

— Raymond Loewy Associates



Finished artwork by Raymond Loewy design experts of the final version of a lamp housing.

Implications for Industrial Arts

Study of industrial design influence and techniques are vital to industrial arts education for two major reasons,

(Concluded on page 316)

▶ significant results of a survey concerning —

Ways to Teach I-A Design

RONALD BRO

Many of today's leaders in the field of industrial arts are promoting the teaching of industrial arts design. Recently a stimulating and discerning publication[1] gave new prominence to industrial arts design by listing design as one of three basic "cores of experience."

Although much has been written about the need for teaching industrial arts design, it seems that little has been written concerning methods or procedures for teaching it. Reliable data concerning methods is needed to foster widespread adoption of design instruction in industrial arts. With this purpose in mind, the writer recently conducted a survey on design.[2]

As a part of this study 116 teachers of industrial arts evaluated 40 different methods or procedures of teaching industrial arts design on the secondary level (junior and senior high schools). These teachers were recommended by state and city officials of industrial arts from eleven states as being outstanding in the teaching of design in industrial arts.

Several significant facts, it would seem, emerged from the study. Although there is neither time nor space ample to go into all of the findings, only some of the seemingly more important findings will be presented.

1. General Organization

As the teacher of industrial arts contemplates teaching design to his students, it would seem that his first concern would be that of general organization. He might well ask himself, "How much time should be allotted for design study?" or "Should an entire course be provided?" or "Should design instruction be integrated with the now existent industrial arts courses?" The outstanding teachers of industrial arts design were asked to rate, on a five-point scale, three plans of class organization for design instruction. The results are given under plan 1 through 3.

PLAN 1. Teaching Industrial Arts Design as a Segregated Course

Responses	*Per Cent*
No value	3.4
Little value	37.1
Moderate value	30.2
Much value	12.9
Especially helpful	7.8
No answer	8.6

It would seem evident that Plan 1, offering a separate or segregated course in design is, at best, of only moderate value. On the basis of this low rating we need not consider it further here.

2. Design as a Special Study

There seems to be some difference of opinion regarding plan 2; however,

PLAN 2. Offering a Unit of Two to Four Weeks for Design Study

Responses	*Per Cent*
No value	0
Little value	25.9
Moderate value	34.5
Much value	18.1
Especially helpful	14.7
No answer	6.9

the majority indicate that offering two to four weeks of design instruction is only of "little" or "moderate value."

3. Design Integrated With Activities

It may readily be observed that plan 3, integrating design instruction with the construction of articles, is the most desirable of the plans rated

PLAN 3. Design Instruction Integrated With the Construction of Articles in Most Major Activities of Industrial Arts

Responses	*Per Cent*
No value	0
Little value	0
Moderate value	4.3
Much value	36.2
Especially helpful	57.8
No answer	1.7

by the respondents. Of the 116 outstanding teachers of industrial arts design 94 per cent rated this method to be either of "much value" or "especially helpful." Due to the high rating of this plan an explanation in slight detail on the application of this plan to an industrial arts course is necessary. Please bear in mind that there are many alternative methods of applying it.

In integrating design instruction with project construction the teacher would not need to discard his original course organization. He would, rather, enrich his present course with design instruction. He would present sketches, slides, and magazine illustrations of well-designed and poorly designed articles; show a film on industrial design; discuss function as

[1]William J. Micheels, and Wesley S. Sommers, *The Minnesota Plan for Industrial Arts Teacher Education* (Bloomington, Ill.: McKnight and McKnight, 1958).

[2]Ronald Bro, "An Evaluation of Various Methods of Teaching Design on the Secondary Level" (unpublished Master's thesis, Iowa State Teachers College, Cedar Falls, 1958).

Mr. Bro is assistant professor of industrial arts at Nebraska State Teachers College and supervisor of junior and senior high school metalworking at Chadron, Neb.

Evaluating a finished project is a valuable way to teach design in programs of industrial arts.

applied to design; demonstrate design procedure; provide a field trip to a firm employing industrial designers; have the class, as a group, work out the design of an original article; and encourage his students to design original articles on an individual basis. He would then, together with the students, evaluate the design of articles constructed. Design instruction should not be devoid of instruction concerning the tools, materials, and processes of industry. It should be integrated with it. Tinkham, in his dissertation, stated:

> . . . the designing of the project is an entirely natural procedure. It is not dependent on rules and formulas but stems from a logical analysis of function supplemented by an understanding of tools and materials.[3]

In addition to evaluating various methods or plans for organizing design instruction, the outstanding teachers of industrial arts design were asked to evaluate various plans concerning design procedure, construction of designed articles, and evaluation of student-designed articles. These are discussed in the remainder of the article.

It has frequently been stated that the simplest design is the best design. It is also important that the article be functional. The first design sketched by the industrial designer is not likely to be the best solution to the problem. It is more probable that he will produce many sketches, working in different ideas in an effort to obtain the simplest, most functional design.

4. Sketches of Article

The outstanding teachers of industrial arts design were asked to rate the value of instructing the student to make several freehand sketches of his proposed article. How the respondents reacted to this method may be seen under plan 4.

PLAN 4. Making Several Idea Sketches

Responses	*Per Cent*
No value	0
Little value	1.7
Moderate value	11.2
Much value	54.3
Especially helpful	31.9
No answer	.9

It may be observed that 86 per cent of the respondents rated the plan to be either of "much value" or "especially helpful." It would seem advisable, on the basis of these responses, to use this plan in teaching industrial arts design. Students seem to be anxious to complete their project planning in order to begin construction of the project. Because of this they are frequently satisfied with the first idea they have sketched. It has been my experience, however, that when students are encouraged to make additional sketches they frequently produce an idea which is less "cluttered," more functional, and which they like better than the first one. The use of this method seems to cause students to see design possibilities which they would otherwise fail to visualize.

5. Construction of Articles

Another plan or procedure of design instruction which the outstanding teachers of industrial arts design rated quite high was that of constructing the article. In view of their responses, the opinion seemed to be that it is of considerable more value to have the student build the actual article than for him simply to work out the design on a drawing board.

When the student constructs the article it is likely that he will discover some faults in his design which, in the drawing, were not apparent. He will, also, gain the satisfaction of seeing his own original idea take form to become a functional and beautiful object.

PLAN 5. Constructing the Designed Article

Responses	*Per Cent*
No value	0
Little value	1.7
Moderate value	6.0
Much value	41.4
Especially helpful	47.4
No answer	3.4

6. Evaluation of Articles

When construction is completed, how valuable, from the standpoint of teaching industrial arts design, is it to evaluate the article? The answer to this question may be inferred from the responses of the outstanding teachers of industrial arts design as shown under plan 6.

PLAN 6. Evaluating the Finished Article

Responses	*Per Cent*
No value	0
Little value	.9
Moderate value	7.8
Much value	37.1
Especially helpful	52.6
No answer	1.7

A total of 90 per cent of the respondents rated this plan to be either of "much value" or "especially helpful."

This would surely indicate that evaluation is a significant aspect of design instruction in industrial arts. There are, of course, various methods of evaluation. It may be that the evaluation is performed by the student, or by the instructor, or by both students and instructor. It may be that the parents are brought in on the evaluation after the article has been taken home and put to use. Regardless of the method used, a careful evaluation of the designed article should be made. From the standpoint of design, the evaluation should deal not only with how pleasing the article is to the eye, but also the degree to which it is functional — that is, how well it does the job it was designed to do.

The purpose of this article, and the study which preceeded it, was to establish some basic means or procedures of teaching industrial arts design. The findings make rather clear what might otherwise be questions in the minds of industrial arts teachers who are including design instruction in their program on the secondary level. It may be that these findings also have some implications as to the means of teaching industrial arts design in teacher education institutions.

[3]Robert A. Tinkham, "Design in Industrial Arts: A Study of Creative Modern Design as it Relates to the Teaching of Industrial Arts" (unpublished Doctoral dissertation, University of Minnesota, Minneapolis, 1952), p. 345.

How to Construct the Objective Test

CARL J. KNOLL

▶ The objective test, which can be easily written and scored, is a **favorite of shop teachers.**

▶ But it is also very easy to write bad objective items, and this basic discussion defines in a complete way the **six parts** of the construction of an objective test.

Composing a good objective type test is as rigorous as composing a sonnet, and the final result should be as soul-satisfying. Let us consider what operations are entailed in preparing a good objective examination. Such preparation is divided into six parts: (1) defining the objectives one wishes to measure, (2) carefully outlining the material content of the unit of instruction to be measured, (3) preparing a blueprint of the test, (4) determining what types of items will best test each particular area of knowledge, (5) allocating per cents of the test by content area and by objectives, and (6) determining the spread of item difficulty.

Defining Objectives

Children soon learn to "read the teacher" by studying the types of objectives he emphasizes in his examinations. Too frequently, the youngsters observe that although he delivers himself of glowing speeches on the merits of thinking for one's self and understanding basic principles, his tests reveal that he is interested primarily in specific dates and facts. The teacher might not know this, but the children, interested in a good mark with a minimum of effort, do know it. Therefore, they reason: "Why study for understanding, when he never will test for it?"

The competent instructor makes certain that his stated objectives are also his test objectives. To avoid misunderstanding in this area, it is recommended that the teacher write his test plan after he composes his lesson plan, and before he begins instruction. These objectives should reflect, not what the teacher intends to teach, but what specific changes are to occur in the students.

For example, the student objectives for industrial arts probably would include the following:

1. The student should be able to state the names and functions of all tools and machines used and studied.
2. He should learn the materials used and studied in shop.
3. He should develop understanding of all operations performed and studied.
4. He should know the sources of all materials used and studied.
5. He should understand the principles underlying the fabrication uses of all materials studied.
6. He must develop a thorough understanding of safe work methods, both in the industrial arts laboratory and in the industrial processes he studies.

These objectives, once decided upon, should not then be written and filed away until the teacher is ready to examine proficiency in the unit of instruction: they should constantly be before him as he teaches the lesson. Only by so doing will the teacher's stated objectives correlate with his testing objectives.

Outlining Material Content

One finds it difficult to understand how any teacher can seat himself, take pencil and paper, and begin writing his examination without first preparing a basic outline of material content. Certainly the author's memory is not that good. His memory consists of a lesson plan, carefully designed and carefully taught.

Yes, after he graduated from teacher's college, and after suffering through several courses in methods, he vowed never again to write a lesson plan. However, this resolve soon dissolved as he recognized that he could teach and test more adequately after such preparation. It is our opinion that such planning is absolutely essential to adequate testing.

From the lesson plan, combined with student objectives, the following content outline can be developed for a unit in the reduction of iron ore:

I. The reduction of iron ore
  a) Parts of the blast furnace
    1. Charging hopper
    2. Down comer
    3. Refractory
    4. Iron notch
    5. Cinder notch
    6. Stoves
    7. Damper
  b) Materials used in reducing iron ore
    1. Natural gas
    2. Iron ore
    3. Coke
    4. Limestone
  c) Operations
    1. What occurs in the reduction zone?
    2. What occurs in the absorption zone?
    3. What occurs in the fusion zone?
  d) Know the sources of the following material

Mr. Knoll teaches metalworking at the Arbutus, Md., Junior High School.

1. Natural gas
2. Limestone
3. Iron ore
4. Coke

e) Fabrication uses
1. What is hot metal?
2. To what use is pig iron put?
3. Know the characteristics of pig iron
4. Know the characteristics of wrought iron
5. Know the characteristics of cast iron

f) Safety involved in handling molten metals
1. What clothing is worn?
2. Greatest danger involved in handling hot metals
3. What to do in case of spilling hot metal
4. What similar process in our shop involves similar dangers?

The Test Blueprint

The test blueprint is, quite simply, a mechanical device used to determine what specific items will be used to test material content, and is developed by combining objectives and material content in graph form. A test blueprint developed for examining knowledge concerning the reduction of iron ore accompanies this text.

Determining Items to Be Used

The teacher now is faced with the problem of assigning specific types of objective items to each area. This, it must be emphasized, is not a helter-skelter process: the teacher must ask himself certain questions.

1. To what type of item does this piece of information best lend itself? Obviously, the names of the parts of the blast furnace can most logically be examined by proposing a matching item. The only other course would be to construct a series of seven true-false or completion statements, a rather cumbersome technique when the same end can be achieved by asking one matching item.

2. Does the material require understanding or simple recall? If it requires simple recognition, one would construct a true-false statement, but if the material requires understanding, the best course would be to propose a multiple choice question, wherein the student is offered a series of choices, all of which have considerable appeal. The fabrication uses of metals, for example, does require understanding, and should be examined by asking a multiple choice question.

3. Does the material require only the recognition of a correct answer? In this event, a true-false item will suffice.

A warning might be offered here. The builder of any objective examination must take care not to ask too many true-false items. These seem to be the special pets and darlings of most teachers, probably because it is possible to dash off large numbers of very bad items in a short time, while the construction of a good multiple choice questions, involving five appealing leads is a demanding and time-consuming process. It sometimes seems that one will never find that fifth good lead.

Having carefully considered what type of item will best fit each area of questioning, the builder of the test then enters this information into the test blueprint, and then turns to the problem of determining what percentage to allow for each area tested.

Allocating Percentages

The simple, direct way is strongly recommended by simple, direct people, but it is not necessarily the best way. We could allocate percentages by counting the number of responses and then dividing the resulting sum into 100 per cent. Do we really want, however, to do this? Examine the test blueprint. The first item, "Names of parts of the blast furnace," demands seven responses. Do we wish to allocate seven twentieth's, or approximately one fourth of the test value to this particular question? Obviously not.

Instead, the teacher must decide what areas of the examination he considers of paramount importance and give additional weight to these areas. It is the author's opinion that the materials used and the fabrication uses of the metals produced are of great importance, and should therefore be assigned double value. This results in 37 points rather than 28, and effectively reduces the other items to their proper value.

THE TEST BLUEPRINT

Test Objectives	*Material Content*	*Items*
Names of parts of the blast furnace	1. Charging hopper 2. Down comer 3. Refractory 4. Iron notch 5. Cinder notch 6. Stoves 7. Damper	One matching item.
Materials used	1. Function of natural gas 2. Function of coke 3. Function of limestone 4. When does ore become iron?	Four multiple-choice items.
Operations	1. What occurs in reduction zone? 2. What occurs in absorption zone? 3. What occurs in fusion zone?	Three completion items.
Sources of materials	1. Natural gas 2. Limestone 3. Iron ore 4. Coke	One matching item.
Fabrication uses	1. When does hot metal become pig iron? 2. To what use is pig iron put? 3. What are characteristics of pig iron? 4. Know characteristics of wrought iron 5. Know characteristics of cast iron	Five multiple-choice items.
Safety	1. What clothing is worn? 2. What is greatest danger involved in handling molten metal in our shop? 3. Know what to do in case of spilling 4. What shop process in our shop involves similar dangers as in reducing?	Four T-F items.
Test Objectives	*Material Content*	*Items*

samples of questions in a typical test, in this case on fundamental metalworking, which are derived from the principles set forth in the article.

FINAL EXAMINATION 1958–1959

Name..... **Section**.....

INSTRUCTIONS: Waste no time and do not spend too much time on any one question. Read carefully. Be sure you understand the instructions for each part of the examination. Begin now.

TRUE-FALSE QUESTIONS: If the statement is true, put a circle around the letter "T." If the statement is false, put a circle around the letter "F."

T F It is necessary to get permission to use only the dangerous machines.

T F A red card means that students may not use the machine.

T F Always wear a face mask when using a power machine.

T F Few injuries result from running and playing in shop.

T F When we studied the making of iron, we learned that the word reduce means to make smaller.

COMPLETION QUESTIONS: Read carefully. In the following questions, fill in the spaces with the word or words that best complete the statement.

Industrial Arts is a study of the changes man makes in raw materials to increase their (*a*) ..... and to meet man's (*b*) .....

The aims of Industrial Arts include the following.

(*a*) Learn how ..... operates.

(*b*) Gain knowledge that will help make us better buyers of things. This is called ..... knowledge.

MULTIPLE CHOICE QUESTIONS: Read the questions carefully. In the space before the number of the question, place the letter of the answer that best completes the statement.

... The machine in which iron ore is changed to hot metal is called a/an

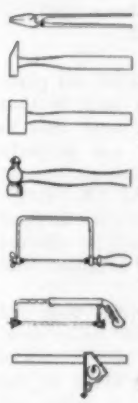
a) blast furnace.
b) Carnegie converter.
c) open hearth furnace.
d) electric furnace.
e) Bessemer converter.

... By the words "True alloy," we mean that two or more metals are

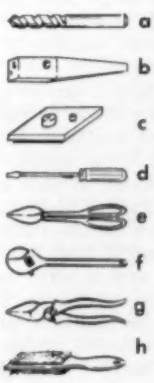
a) chemically combined.
b) combined to give new characteristics.

MATCHING QUESTIONS: Information is arranged into two columns. In the space before each item in column I, place the letter of the item in column II that best matches the column I item. Use each item in column II only once.

I	II
... Down comer	*a*) Enables the operator to reduce heat.
... Stove	*b*) Enables the operator to tap hot metal.
... Cinder notch	*c*) Enables the operator to increase heat.
... Iron notch	*d*) Enables the operator to tap slag.
... Charging hopper	*e*) Permits excess gasses to escape.
... Damper	*f*) Enables the operator to look into the furnace.
	g) Enables the operator to put materials into the furnace.



a ... blacksmiths tongs
b ... ball peen hammer
c ... combination square
d ... mallet
e ... hack saw
f ... tinners hammer
g ... jewelers saw



a ... aircraft snips
b ... rivet set
c ... twist drill
d ... file brush
e ... straight snips
f ... screw driver
g ... bending jig
h ... crescent wrench

Item Difficulty

How many times has the average teacher administered an examination only to find that the marks achieved differed greatly from what he had expected? How does one justify an average mark of 93 per cent or of 47 per cent? Obviously, something has gone wrong! This can be corrected by deciding in advance how difficult the test should be, after which the teacher makes a determined effort to make a certain number of items very difficult, a certain number very easy, and so forth. Unfortunately, this procedure involves making an educated guess: no simple formula for this operation can be offered. The important thing is that the teacher be aware of the problem and consciously try to take it into consideration.

It should be remembered that certain items are, by their very nature, easier than others. The true-false item, because it involves only the recognition of a correct or incorrect answer, is inherently simpler to answer than a multiple-choice item.

In Summary

Now we have completed our planning. The assumption here is that most teachers already know how to build test items that are properly challenging (for more information on item selection, see your IA/VE for November, pp. 263–264) and in good form, so it remains only to discuss how the items shall be arranged into the finished test.

It is generally accepted that one should place the easier items first, but this has certain shortcomings. This requires that the child, at the very moment when he is tiring and somewhat sick of the whole affair, is faced with the necessity for answering the more difficult questions. The obvious solution is to begin and end with easy items, placing the more difficult ones somewhere in the middle of the examination.

Of course, it goes without saying that like items should be grouped together, multiple-choice together, and so forth. This makes the problem of giving instructions simpler.

This brief paper is not intended to stand as a definitive study of the great "sport" of test building, for obviously the subject is too complex to be treated exhaustively in such a short time. It is designed, rather, to call to attention some of the basic planning steps that might have been forgotten or ignored, and to serve as a guide for the young teacher until he can no longer escape that difficult course in tests and measures he has thus far managed to escape. ◀

Red Bank's I-A Club

JOHN F. MOSES

Industrial Arts Department, Red Bank, N. J., High School

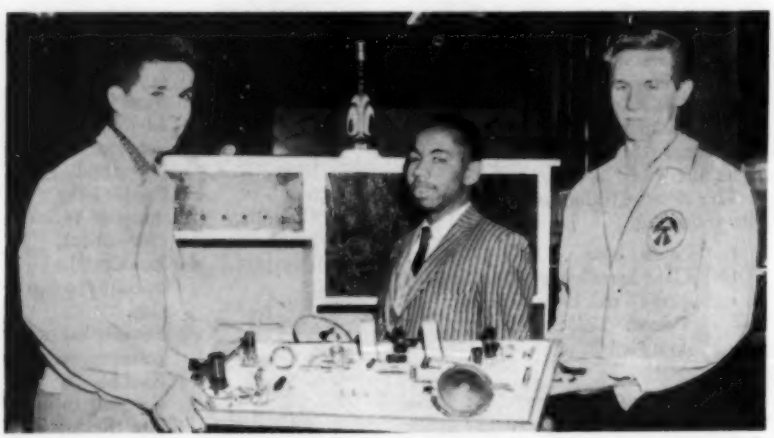
Formed three years ago under the name of the Red Bank High School Stage Craft Club, the group made properties, settings, and scenery for the various dramatic productions of the school. Last year the club changed its name to the Red Bank High School Industrial-Arts Club because they wanted to do more than make stage settings and properties.

Membership in the Club is restricted to 16 members — four from the senior class, four juniors, four sophomores, and four freshmen. The only requirement is to be enrolled in, or to have completed General Shop I of the high school curriculum. Each member of the club is handpicked by the advisor for a different reason — some because the club needs them, and others because they need the club. The club has helped many boys feel that they have a definite "belonging" to the school and to the community.

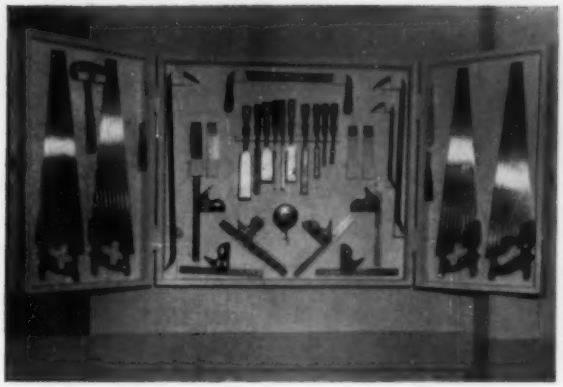
The "I.A." club's main objectives are to be of service to the school and to the community. Some of the ways that these objectives have been accomplished are: by setting up the staging for the school assemblies, by making properties for the various dramatic productions, by planning and supervising all the exhibits of the industrial-arts department — whether at the school or in competition throughout the state and in New York — by planning and building the official Halloween float for the community for the past two years, and by making some displays for local merchants who in turn gives the I.A. department window space for the use of exhibits.

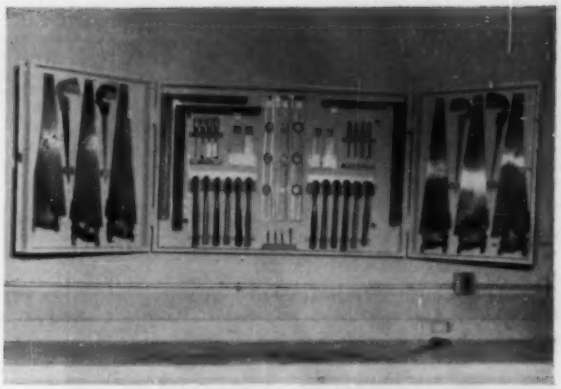
At least once a year the Club runs a mass production project to raise money. Last year, shadow boxes were made at Christmas time and over $25 profit was cleared. This past Christmas, the boys made and sold birch log candle holders. The proceeds from this project was used to purchase Christmas presents for "Joey," age eleven of a welfare family. This project was in co-operation with other school organizations. There are no set dues as little money is needed. Each boy must purchase his own jacket. The emblem for the jackets was designed by a member of the club.

Working with the club has given the advisor an opportunity to get to know each of the members personally. The club has been instrumental in preventing some drop-outs and, in some cases, where drop-outs have occurred, the boy probably will have an easier time finding his place in society. ◀



Instructor Moses is shown (center) with two members of the Red Bank Industrial Arts Club and an electronics project that won first place in a conference at Oswego.





How to Lick the Tool Storage Problem

ALLAN L. UTECH

Our experiences with a working area storage of tools possibly parallels that of others. Over a period of several years, many dollars were spent for tools because the tools just didn't get put back where they were supposed to be. The expense of tool replacement dictated that an improved system be set up.

An efficient tool storage system warrants some thinking and time. The cabinets must be adapted to the tools that you have. It may mean that new cabinets be built. Wall cabinets that can be locked have worked well for us. The lock is mainly for the benefit of those who may wander through the shop at odd hours of the day.

Principles of Storage

An improved system can be initiated by observing certain principles of storage. These are as follows:

1. Place the tools in areas where they will be used.
2. Decide what tools are to be placed in the cabinet and the best arrangement for them.
3. Provide easy access for use.
4. Hang tools positively.
5. Silhouette most tools and use a system of numbers on others that can't be silhouetted in order that each tool be put back in its own particular place.
6. Lastly, don't overlook classroom instruction on the care, use, and storage of tools.

Steps in Tool Storage

The first step in tool storage is to sort out the tools that you want to put into each cabinet. The next step is to consider the placement of the tools. Some might want to sketch the arrangement and/or lay the tools on the floor or a table. Put enough tools in the cabinets but not enough to make them appear cluttered.

When you have decided what goes where, the next step is to hang the tools. Gravity and the design of the tools will suggest several ways to fasten or hang the tools. We used several methods in each cabinet. L-hooks were used for hand saws (holes were drilled in the saw blades that didn't already have them), combination squares, bevel squares, adjustable wrenches, box-end wrenches, etc. The crowbars, compass saws, wood chisels, sockets and hammers were held in place by holders made from ¾-in. plywood. The hand saw handles were fastened with a plywood insert with a catch attached, to keep the saw from flopping in the door. The holders for the wood mallet, framing square, combination wrenches, folding rules, pliers, and levels, were made from scrap shearings of galvanized metal that were given to us by a local tinner. The metal holders were fastened in the cabinets with metal screws. The wrench cabinet had extra depth because of its trapezoid shape. It was possible to hang eight hack saws on the door by using ½ by 8 in. mild steel holders.

When a person opens a cabinet he should expect that the contents will not fall in his face. Each tool has a positive fastening that protects the tool as well as the person using it.

Putting Tools Back

We now have a place for everything. There are several things that a cabinet can do itself to assist in getting everything back in its place. A tool silhouette shouts out, *"Put me back!"* A system of numbers can also be used for the tool check.

In our tool storage cabinets as well as in our entire shop, we have gone all out for "color conditioning." It is a system that has much to offer.

The procedure outlined does take more time than some other systems of tool storage, but it is a system that works. The students in your classes can do part or all of the work.

Our tools are in place and we haven't lost a tool from our six tool cabinets since they have been in use.

Mr. Utrech is an instructor of vocational agriculture with the Cambridge, Ill., Schools.

IA/VE
projects / problems

ELECTRIC GUITAR

JACK C. CRAWFORD and JOE T. HARWELL
Teachers of General Shop
Synder, Tex., Junior High School

A challenging and popular project for students of ability in general shop is the solid body electric guitar. At a cost of less than 30 dollars, students can build an instrument of exceptional beauty, value, and usefulness. They are receiving at the same time a number of rich technical experiences in a wide range of general shop activities.

As will be seen in the following plans and instructions, the project provides the student with experiences in drawing and planning, electronics, use of hand and power woodworking tools, wood finishing, working with plastics, hammering, forming and working with metal and other manipulative experiences usually associated with a well-planned and properly supervised general shop program.

The guitar plans and instructions presented in this article are offered as suggestions. Students and instructors are encouraged to change and improve the designs to suit their individual taste.

Body and Neck Construction

The materials for body and neck should be surfaced on four sides to the following dimensions: Part A, 1½ by 6 by 18 in.; Part B, 1½ by 2¼ by 18 in.; Part C, 1¾ by 2¼ by 26 in.; Part D, 1¾ by 2 by 8 in. Using dado cutters, notch parts B and C. This operation will save much tedious work later when the neck is jointed to the body. Glue together parts A and B and parts C and D. A water resistant glue is recommended, using regular gluing techniques. Enlarge plan of guitar body and head from grid drawing to full size and transfer to glued up parts. The shape of body and head may be changed or redesigned to suit the builder. Altering the shape will not affect the tone as the sound is carried to the amplifier by pickups mounted under the strings.

Using a ¼-in. blade on the bandsaw, cut out body and neck. Remove saw marks and round off edges of body with shaper using a ⅜ in. round over bit. Do not round edges of notch that will receive the neck.

Cut the top side of the head down ½ in. on the jointer from the gear end to within 3/16 in. of nut position. Splintering caused by the heavy cut will be removed by the next operation. Mark off side elevation and bandsaw to rough dimensions. Shape and sand neck to semi-finished condition.

Glue neck to body. No angle of neck to body is required in this joint as the angle has been cut into the neck in a prior operation. Shape body to neck. Square projections at neck joint should be shaped to flow smoothly into the neck.

Thinning operations on the body, as indicated on the drawings, may be done speedily with a portable belt sander using a course grit.

Next locate position of pickups and controls. Rout grooves for pickup wires and drill space for controls to proper depth. Locate position of keys and drill with 21/64-in. drill to receive bushing for ¼-in. individual gears (keys). Cut slot for nut and glue on fretboard. At this stage, most of the sanding should be completed. The student is encouraged to use necessary precautions to avoid marring or scratching the wood.

As this is a 25½ in. scale fretboard, the front edge of the bridge should be located 25½ in. from edge of nut. All parts should be temporarily mounted and then removed for finishing operations.

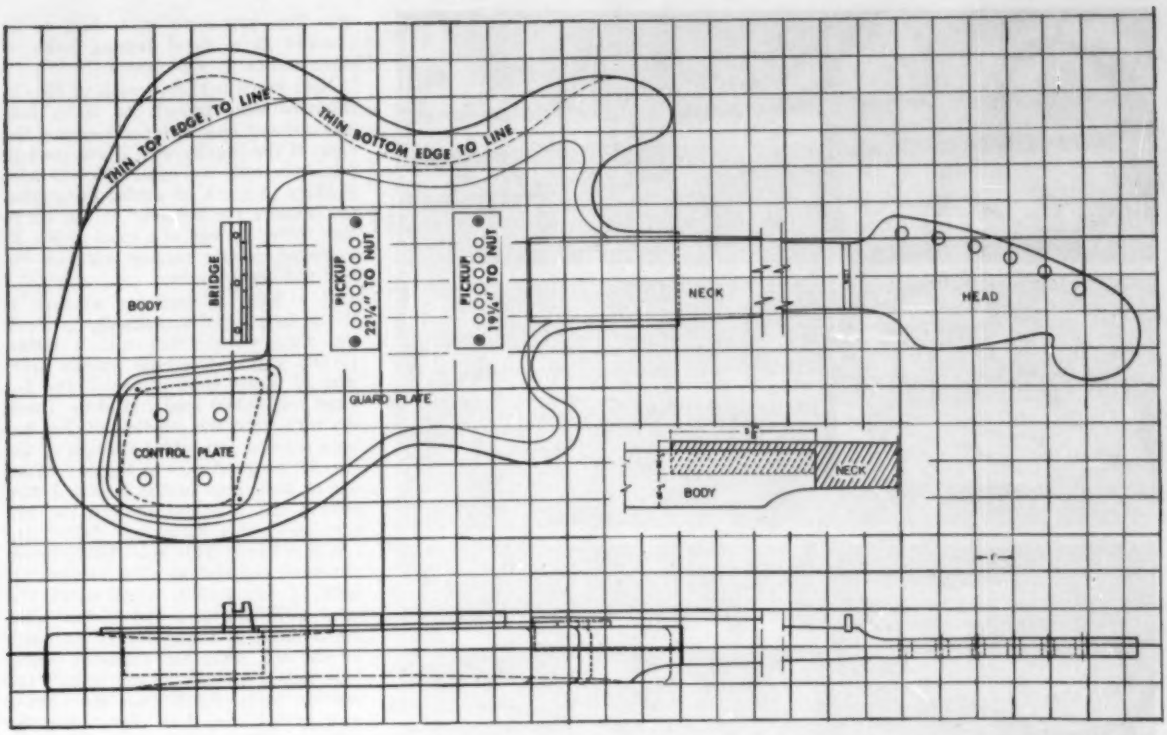
General finishing practices should be observed. No special finish is recommended to improve the tone. Suggested finishes are: lacquer, varnish, or a simple finish of half and half white shellac and alcohol, followed by several coats of wax.

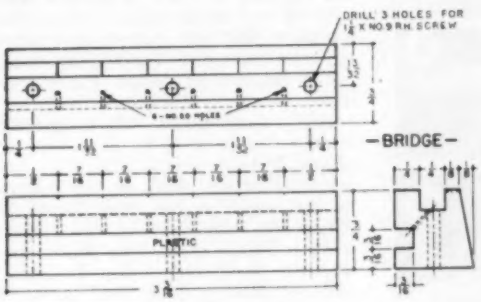
After rubbing and polishing, permanently mount all the parts and accessories. String up the instrument. (See wiring diagram for control hook-up.) If the strings do not seat properly in the nut slots, a strip of plastic ⅛ by ⅜ by 1¾ in. may be placed across the strings just behind the nut. Fasten with 3 No. 7 by 1 in. F.H. screws using just enough down pressure on the strings to hold them in place.

Parts and Accessories

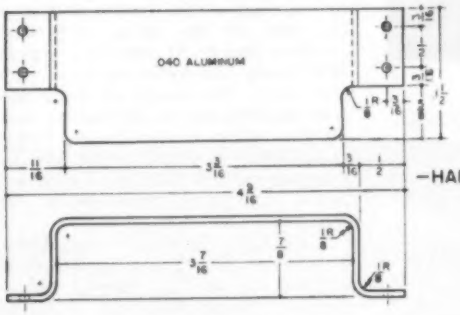
All the parts and accessories may be purchased from musical instrument supply houses. However, it is recommended that the builder construct as many of the parts as possible. By manufacturing the parts, students will receive a wealth of experience and benefit by reducing the total cost. Items listed in the materials bill preceded by an asterisk have been successfully constructed by junior high school students. These parts described below are shown in detail on the drawings.

Pickup Construction. The following suggestions are offered in constructing and winding the pickups. Cut the top and bottom from plastic sheet. Lay out the spacer or core on a piece of plastic slightly larger than the finished item. Drill the holes for the Alnico magnets. (A twist drill with the rake ground parallel to the shank is less likely to grab or chip out.) Cut and smooth core to correct size and shape. This procedure will reduce the danger of breaking out the thin wall of the core. Cement the top to the core with plastic cement. Drill holes in the top plate using holes in core as a guide. Cement the back plate in place and drill through one of the ¼-in. holes nearest the center of the core. Drill a 5/16-in. hole through the back plate near the core for wire outlet. Insert a ¼ by 1½ stove bolt through the center hole and add a

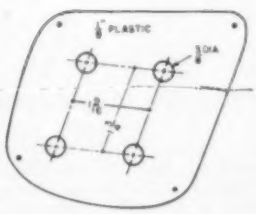




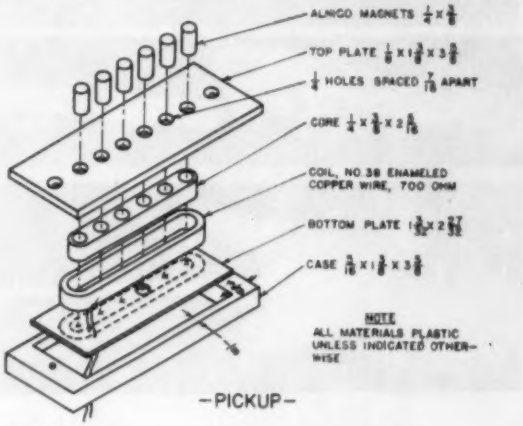
—BRIDGE—



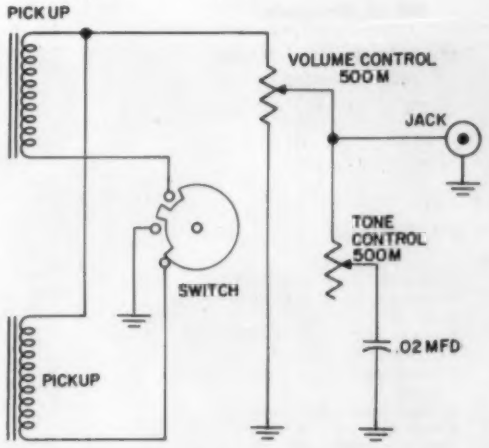
—HAND REST—



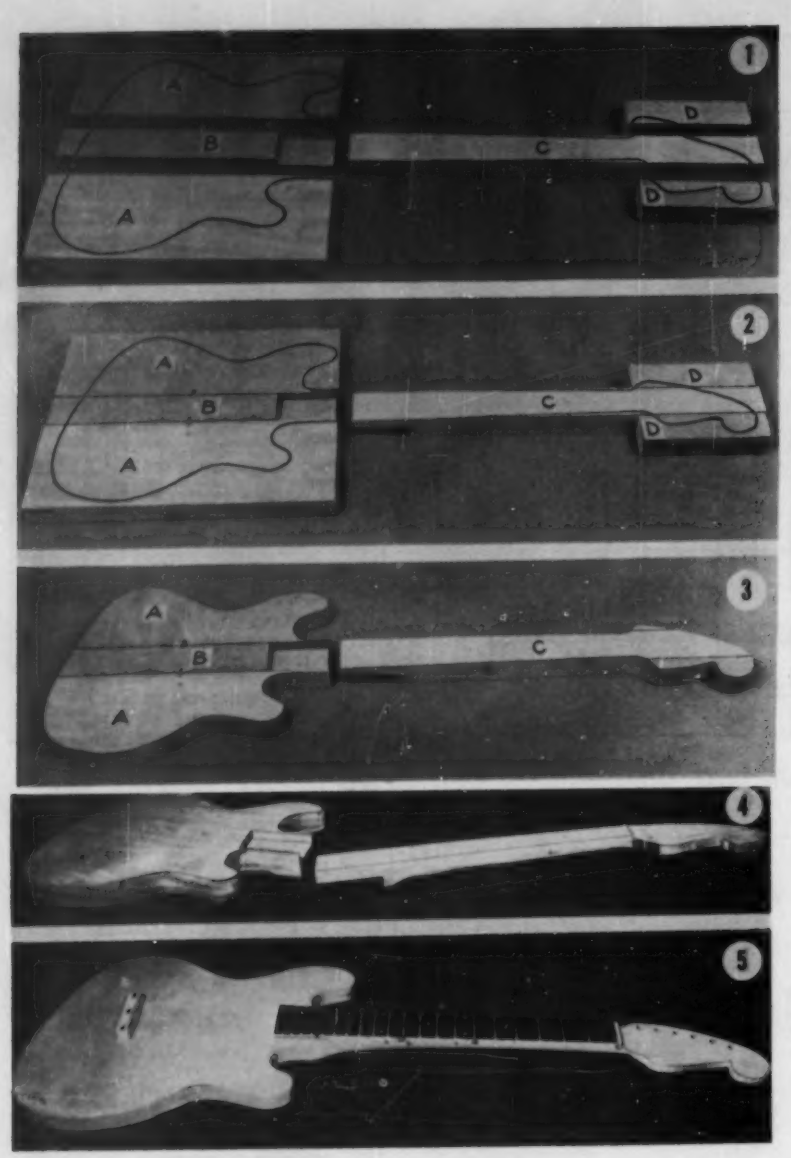
—CONTROL MOUNTING PLATE—


ALNICO MAGNETS 1/4 X 3/8
TOP PLATE 1/8 X 1 3/8 X 3 3/8
6 HOLES SPACED 7/16 APART
CORE 1/4 X 3/8 X 2 5/16
COIL, NO.38 ENAMELED COPPER WIRE, 700 OHM
BOTTOM PLATE 1/32 X 2 27/32
CASE 3/16 X 1 3/8 X 3 3/8
NOTE
ALL MATERIALS PLASTIC UNLESS INDICATED OTHERWISE

—PICKUP—



WIRING CIRCUIT



Bill of Materials

Body & Neck (Hard Maple recommended)

Part A — 2 pc. — 2 x 6 x 18" Body
Part B — 1 pc. — 2 x 2⅝ x 18"
Part C — 1 pc. — 2 x 2⅝ x 26" Neck
Part D — 2 pc. — 2 x 2 x 8"

Parts & Accessories

Quan.	*Item*
6	Individual gears (keys)
6	Inserts for gears, N.P. Steel
1	Bone nut
1	Fretboard
1	Flat solder lug plug
2	Volume controls, 1" dia., 500,000 ohms
3	Control knobs, ¼" shaft
1	Phone jack
2	Tone condensers, .02 mfd.
1	Rotary switch, 3 way
1 set	Guitar strings
*2	Pickups 1 — Spool No. 38 enameled copper wire 2 pc. — ⅛ x 1½ x 4" plastic 2 pc. — 1/16 x 1¼ x 3" plastic 2 pc. — ¼ x ½ x 3" plastic 4 — No. 7 x 1" wood screws, F.H., N.P. 4' — No. 24 lead wire, insulated 12 — Alnico magnets, ¼ x ⅜" rnd.
*1	Bridge 1 pc. — ¾ x ¾ x 3¾" plastic 3 — No. 9 x 1¼ wood screws, R.H., N.P.
*1	Hand Rest 1 pc. — 3S aluminum, .040 x 1½ x 7" 4 — ⅜ x No. 3 wood screws, R.H., N.P.
*1	Guard Plate 1 sq. ft. — plastic sheet, ⅛" thick 9 — No. 3 x ⅜ wood screws, R.H., N.P.
*1	Control Mounting Plate 1 pc. — plastic, ⅛ x 5 x 4"
	Miscellaneous finishing materials

nut. This will serve as a shaft to be chucked in a metal turning lathe or other source of slow speed.

Next insert a 12-in. length of No. 24 insulated wire through the 1/16-in. hole and make at least two turns around the core. If the heavier wire is not used to begin the coil, the lighter No. 38 wire is likely to break off during installation and require the removal of the entire coil. Solder the end of a spool of No. 38 enameled copper magnet wire to the lead and begin winding.

If a lathe is used for winding, it should be stopped occasionally to check the ohms on the coil with a meter. (When checking, scrape enamel from wire to insure good contact.) The finished coil should read 700 ohms. Break the wire when the required reading has been reached and solder a length of the No. 24 insulated wire to the end. Wrap one or two turns of the insulated wire around the coil and project the end through another 1/16-in. hole drilled into the back plate. This hole should be on the same end and as close to the first hole as permissible. Care should be used in drilling as a slip at this point might mean a damaged coil. To finish off the coil, wrap two turns of plastic tape tightly around the coil to hold the wire in place. Finally cut the outside case from 5/16 in. thick plastic. Slip the coil assembly in place in the case and sand off any excess plastic around the top plate. Drill and countersink mounting holes and polish. Press ¼ by ⅜-in. Alnico magnets into place. The pickup is then ready for installation.

Bridge Construction. The bridge will require 1 piece of ¾ by ¾ by 3¾-in. plastic. If two or more guitars are under construction, make all the bridges in one length as one short length is difficult to handle on a bench saw. Using a regular crosscut or plastic cutting saw blade, cut grooves to dimensions on drawing. If an oval fretboard is used, the bridge must be shaped to the contour of the fretboard. Cut in the slots for the strings with small jeweler's files to fit individual strings. Bore string and mounting holes, sand and polish. The height of the strings from the frets may be adjusted by sanding the bottom of the bridge. Strings should be close enough to the frets for easy playing and undistorted tone, yet not so close as to vibrate against the frets below the fingers.

Hand Rest. Cut hand rest to dimensions from .040, 3S aluminum. Use the ball part of a small ball peen hammer to produce hammered effect. Bend to shape, drill mounting holes, and polish.

Guard Plate. Enlarge grid drawing of guard plate to full size and transfer pattern to ⅛-in. plastic sheet of desired color. Cut out with bandsaw and/or jigsaw. Drill mounting holes, sand and polish around edges. By leaving the protective paper backing on the plastic sheet until the cutting and buffing operations are completed, no polishing will be necessary for the top surface.

Control Mounting Plate. Follow general procedure for guard plate.

UTILIZING SCRAP STOCK

JOSEPH PELLEGRIN
Carlisle, Ohio, Schools

Woodworking instructors are frequently faced with the dilemma of what to do with small pieces of stock that accumulate during the school term. Too often they become scrapped or become fuel for the school furnace. Although this may serve as an answer to the problem it is not considered sound shop economics.

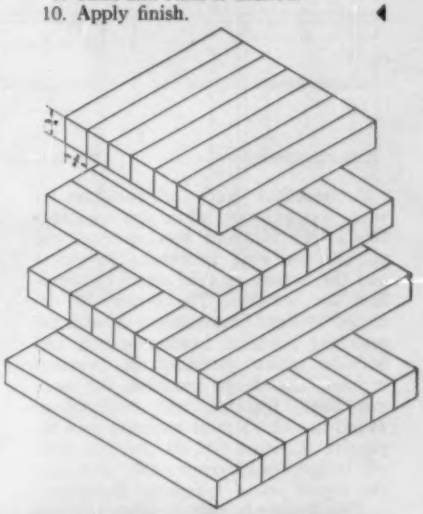
One successful method found of disposing of small left-over stock is through the fabrication of a bowl which could be used for nuts, salad, fruit, or candy. The purpose of the bowl is twofold: the utilization of small stock that may otherwise become scrapped; a secondary project near the end of the school term when time does not permit a larger item to be built. At this time the small piece rack has usually become overloaded and is ready for cleaning.

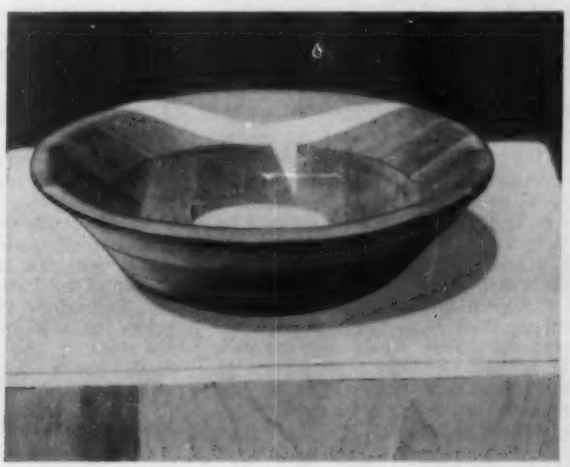
During the course of a term many students may have occasion to use the wood turning lathe, but for turning between centers only, therefore the turning of a bowl attached to a face plate will provide new experiences for many students.

Other machines used in the process of constructing the bowl will be the circular saw, jointer, surface planer and the band saw.

Procedure for Bowl Construction

1. Cut stock ¾ by ¾ in. to the desired length (the length of the stock will determine the diameter of the bowl).
2. Glue already planed edges of ¾-in. strips to form board whose width will equal its length.
3. After the glue has dried, surface both the face and back of the boards to desired thickness.
4. Stack boards, alternating the grain pattern for gluing.
5. Glue enough boards together until desired height is reached (average height of bowl is 5 to 6 in.).
6. After glue has dried, mark center of bowl stock and mount face plate.
7. Cut off corners on band saw to facilitate turning on the lathe.
8. Mount surface plate and bowl stock to the lathe and turn to desired contour.
9. Sand and stain if desired.
10. Apply finish.





A MODERN DRESSER

JOHN W. HAMPTON
Dallas, Tex.

A beautiful piece of furniture is what you will have when you construct this lovely Mr. and Mrs. dresser, and place it in your bedroom. Sturdiness and the beauty of solid wood construction are features. The dresser is designed to blend harmoniously in with the matching bookcase headboard bed, and bedside tables described in previous articles. The design combines the modern lines, features, and construction found in today's most exclusive and expensive furniture, yet its cost fits modern budgets much more easily than does the lowest priced unfinished furniture.

This dresser is built of white oak and finished in limed oak. The construction of this dresser is easy and inexpensive. Construction time should be around seventy hours.

Procedure

1. Choose the surface of the top to be the top surface. On each end of the undersurface cut a ¼ by ¾-in. dado, ¼ in. away from the end, and end it 1 in. from the front edge. Make a ⅛ by ¼ in. rabbet along the underside of the back edge to accept the dust back, ending it at the dado on each end.

2. On the inside surface of each side cut the three ¼ by ¾-in. dados to accept the drawer dividers, ending each ¼ in. from the front edge. Make a ⅛ by ¾-in. rabbet along the inside rear edge the full length of the side to accept the dust back.

3. The bottom is a frame made up of four 1 by 3 in. pieces of hardwood, with a ⅛ in. thick masonite dust panel set into it. The frame measures 1 by 18 by 60 in. Each corner has a mitered joint, reinforced with dowels. The inside edges of the frame are dadoed ⅛ by ¼ in. for the two ⅛ by 12½ by 26 in. dust bottoms to be inserted. The top of the masonite insert should be ¼ in. below the top surface of the frame.

4. Assemble the bottom. Be sure the bottom is square before the glue joints set.

5. After the glue has set on the bottom, repeat step one, only this time make the cuts on what is to be the top surface of the bottom.

6. All of the drawer dividers have a ⅛ by ¼-in. dado cut along the center of one edge to allow the dust panels to be inserted. The top of the dust panels should be ¼ in. below the top of the drawer dividers.

7. The base is cut as shown. The joints are double mitered and reinforced with glue blocks.

8. The design on the two side top drawers consists of nine equally spaced 1/16 in. deep saw kerfs, cut parallel to the top of the drawers.

9. Each of the ½ by 16½ in. drawer guides has a ¼ by 1 in. dado cut on one side.

10. Drawer construction is as shown or it may be of your own choosing.

Assembly Procedure

1. The job of finishing the dresser is made much simpler if all parts are carefully sanded before they are assembled.

2. It is best to assemble the base first. Due to the mitered joints and the slanted sides, glue blocks reinforced with flat head, wood screws should be used on the inside of each joint and on the back ends of each side.

3. The shell of the cabinet should be assembled next. Lay out the two sides, top, and bottom in their respective assembled positions, apply glue, assemble, and clamp. Be sure to wipe away excess glue with a damp cloth.

4. The drawer dividers and masonite dust panels may be installed while the glue joints on the shell are drying. Be sure all of the joints are clamped before the glue starts to set.

5. When the cabinet and the base have dried thoroughly the base is glued onto the frame of the bottom member of the cabinet.

6. The drawer assembly procedure is practically self explanatory. Assembly is easiest by gluing the sides to the front, then adding the bottom, and gluing the back on last.

7. After each drawer has set, the ¼ by 1 by 16⅝ in. center guides are glued and screwed onto the bottom of each drawer.

8. After making sure of the drawer fits, glue the dadoed center drawer guides on the bottoms of each drawer compartment. Before the glue sets, insert the drawers, lining them up while

the glue is still wet. Leave the drawers in the cabinet until the glue has set.

9. The masonite dust back may be nailed, glued, or attached with screws to the back of the cabinet.

10. Before starting the finishing procedure, holes should be drilled for the drawer pulls.

Finishing Procedure

The dresser described has a limed oak finish, but it could have been finished many different ways. If you prefer a limed oak finish the following steps will assure you of a good finish.

1. Sand well all surfaces to be finished, ending with 6/0 sandpaper, making sure all scratches and chips are removed or feathered out.

2. Raise the grain at least two times to make sure all mars are removed.

3. Remove all sanding dust with an air hose and wipe the surfaces down with a clean dry soft cloth.

4. Apply as many coats of a good white wood filler as is necessary or desired to fill the grain smoothly and evenly.

5. After the wood filler has dried thoroughly, sand all surfaces very lightly with very fine steel wool, and again clean surfaces with an air hose and a soft clean cloth.

6. In order to be sure that the wood filler won't turn yellow, white water lacquer should be used for the finishing.

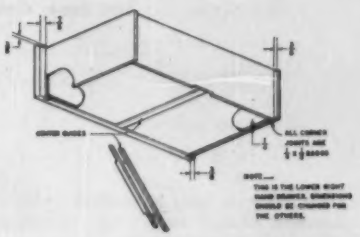
7. Apply two or more coats of white water sanding sealer lacquer, rubbing to a smooth finish between each coat with fine steel wool.

8. Before applying the finishing lacquer, be sure the final coat of sanding sealer lacquer has thoroughly dried, and has been rubbed to a glass smooth finish with steel wool.

9. Apply four or more coats of water white finishing lacquer. The thinner, and more coats applied, the better the finished surface will be. After each or every other coat of finishing lacquer, the surfaces should again be rubbed down with very fine steel wool and cleaned.

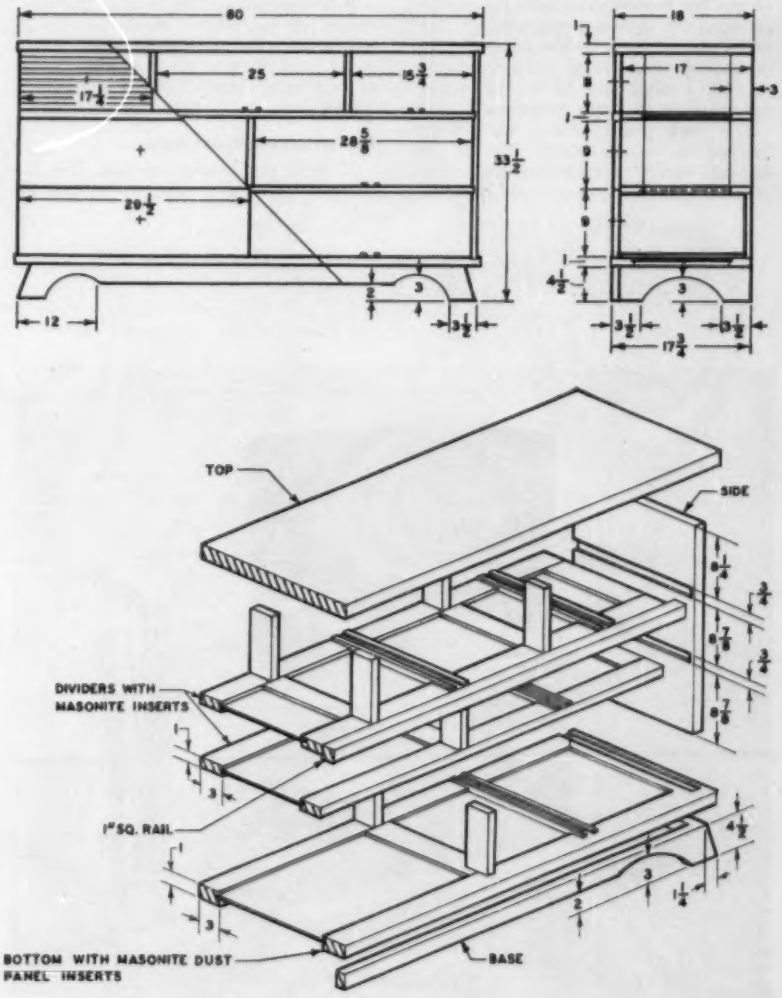
10. After the final coat has been applied, rub down the surface again with very fine steel wool. Rub the surface briskly with clean soft toweling or cheese cloth. If you have been careful in the above steps a mirror-like surface will be obtained.

11. For protection a good coat of automobile or furniture paste wax should be applied.



Bill of Materials

Quan.	Part	Material	Size
1	Top	White oak	1 x 18 x 60"
2	Sides		¾ x 17 x 27½"
1	Drawer front		¾ x 8 x 59½"
2	Drawer front		¾ x 9 x 59½"
1	Rail		1 x 1 x 59½"
2	Bottom frame		1 x 3 x 60"
2	Bottom frame		1 x 3 x 18"
1	Bottom frame		1 x 3 x 12"
1	Base front		¾ x 4½ x 60"
2	Base sides		¾ x 5 x 17¾"
6	Drawer sides	White ash	½ x 8 x 17⅞"
2	Drawer backs		½ x 8 x 15"
1	Drawer back		½ x 8 x 24½"
8	Drawer sides		½ x 8⅝ x 17⅞"
4	Drawer backs		½ x 8⅝ x 28"
4	Drawer dividers		¾ x 3 x 58½"
7	Drawer dividers		¾ x 3 x 11"
7	Drawer guides		¼ x 1 x 16⅝"
7	Drawer guides		½ x 2 x 16½"
1	Drawer bottom	Plywood	¼ x 16½ x 24¼"
2	Drawer bottom		¼ x 16½ x 15"
4	Drawer bottom		¼ x 16½ x 28"
2	Dust bottom	Masonite	⅛ x 11½ x 12⅝"
1	Dust bottom		⅛ x 11½ x 23¼"
2	Dust bottom		⅛ x 11½ x 25¼"
2	Dust bottom		⅛ x 12½ x 26"
1	Dust back		⅛ x 27½ x 58½"
7	Knobs	Brass	2¼" diameter



A PORTABLE BARBECUE

J. W. CHAPLIN
Assistant Professor of Industrial Arts Department
San Jose, Calif., State College

The projects used in today's activity classroom should reflect the changing culture of the community. Many projects depicting the desires and the ideas of modern homemaking with its emphasis upon the informal and outdoor way of life can be made in the general metal or general shop. These projects should provide a vital and interesting means for teaching the basic processes.

One such project which has created interest at the secondary level is the wrought metal, portable barbecue. This project incorporates numerous desirable metal working operations and can be made for a relative low cost to the student. The material used in this project may often be obtained free from construction people for the asking. The materials are as follows: steel reinforcing rod, a discarded agriculture disk, sheet metal, and various shop manufactured parts such as threaded screw, finger nut, wheels, etc.

Construction Procedure

1. Bend the reinforcing rods. The L-shaped bend for the leg and frame is the simplest for the student. These bends are formed cold in a large vise or rod bender. A suggested procedure is to draw full-sized plans on the floor with chalk. The student can check his forming with the drawing on the floor.

2. Form the front legs. Both legs should be placed in the bender at the same time to make certain that they are formed to the same width.

3. Cut and fit the braces.

4. Bend the steel for the U-shaped support which holds the cutting block.

5. Bend the frame for the shelf. The shelf should have all corners bent in the bending machine so that they will have the same radius. The ends of the shelf are butt welded in the center of the back side of the shelf.

6. Weld the frames together. The frame member must be placed on the inside of both of the front legs which means that there is a right and a left side to consider. It is desirable to have a fixture to hold the parts together while welding, but it is possible to work merely by clamping the various parts to a welding table.

7. Weld the disk to the frame. The disk is placed on the floor of the welding booth and the frame is then placed upside down on the disk. The ends of the frame are leveled on the disk by means of firebrick. The braces which extend from the wheel legs attach to the center of the disk. To prevent cracking when welding the braces to the disk, high carbon or stainless steel arc welding rod should be used.

8. Arc weld the shelf to the frame.

9. Place grill elevating screw and the finger nut into position and weld. The finger nut is made of 5/16 in. key stock ground to fit the helix angle of the screw thread. The single finger which serves as a nut is self-cleaning and keeps the threads of the screw free from clogging materials.

10. Weld the expanded metal to the under side of the shelf.

11. Weld the cutting block mounting to the frame.

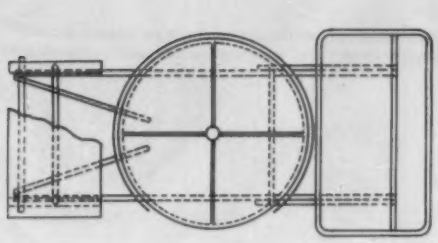
12. Mount the wheels on the axle. Clamp axle in position and weld to the rear legs. The frame should be placed in an upright position for this operation is to assure the correct positioning of the axle. After welding, cut off the excess length of legs.

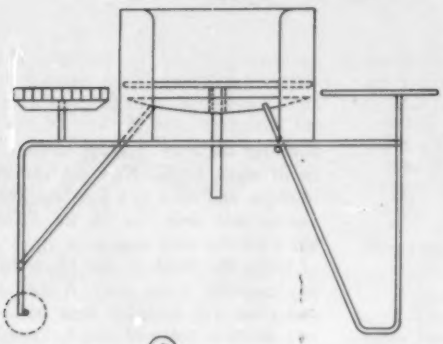
13. Form the grill frame. The frame is made by forming a ring. The two cross rods of the grill are welded to the screw and the ring, forming the grill frame.

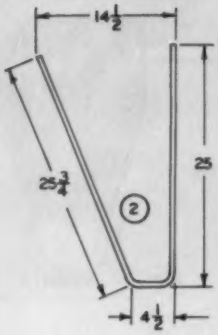
14. Fasten the windshield to the frame. The shield is rolled to maintain ½-in. clearance for all positions of the grill. Weld the shield at the four points where it comes into contact with the frame.

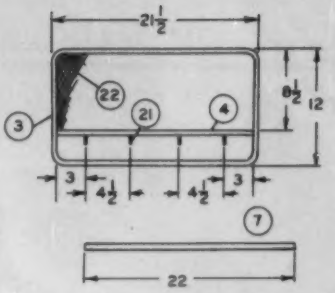
15. Form hooks for the fire tool holders. The hooks should be welded to the front of the shelf. A ring can be placed on the end position of the shelf for a towel holder.

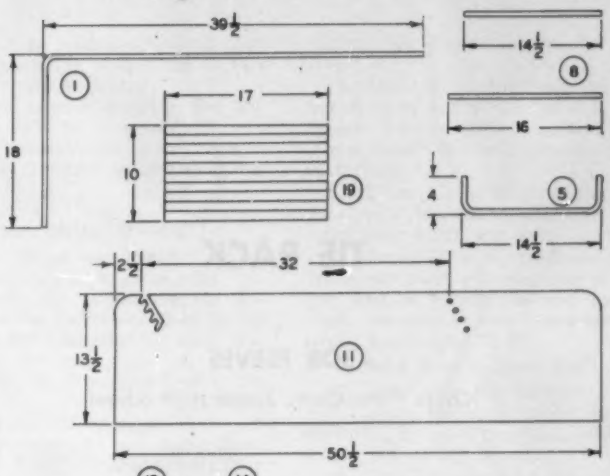
16. Such accessories as forks, turners, tongs, spatulas, skewers, spits, ovens, and even spit motor units provide many smaller projects.

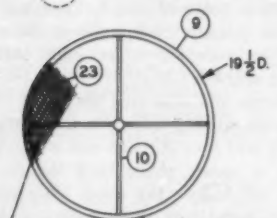




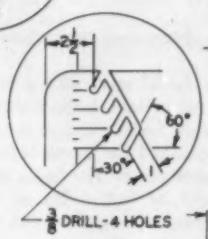




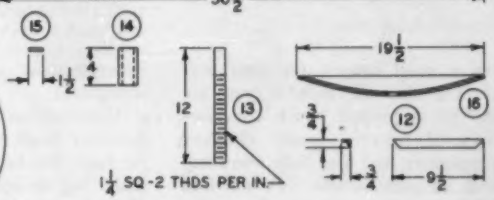




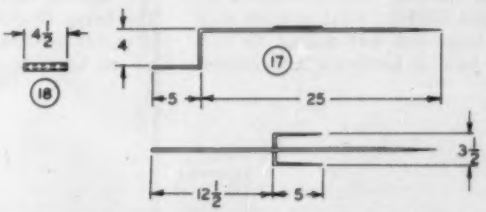
GRILL & SHELF $\frac{3}{8}$ X $1\frac{1}{2}$ EXPANDED METAL ROLLED FLAT



$\frac{3}{8}$ DRILL-4 HOLES



$1\frac{1}{4}$ SQ-2 THDS PER IN.



BILL OF MATERIAL							
NO.	PC.	PART	MATERIAL	NO.	PC.	PART	MATERIAL
1	2	L FRAMES	1/2 REIN S.	13	1	ELEVATING SCREW	1-1/4 C.R.S.
2	2	FRONT LEGS	"	14	1	SCREW GUIDE	1-1/4 PIPE
3	1	SHELF FRAME	"	15	1	FINGER NUT	5/16 KEY STK.
4	1	SHELF SUPPORT	"	16	1	DISK	AGR. DISC
5	1	U SUPPORT	"	17	1	SPIT	1/4 C.R.S.
6	1	FRAME BRACE	"	18	1	SPIT HANDLE	1/4 PIPE
7	2	DIAG. BRACES	"	19	1	CUTTING BLOCK	WOOD
8	1	AXLE	1/2 C.R.S.	20	2	WHEELS	4 D. RUB
9	1	GRILL FRAME	3/8 HRS	21	4	TOOL HOOKS	1/4 D. HRS
10	4	GRILL SUPPORTS	1/4 D. CRS	22	1	SHELF	EXP METAL
11	1	SHIELD	16 GA. HRS	23	1	GRILL	" "
12	2	BLOCK SUPPORT	3/4 ANGLE				

TIE RACK

BOB REEVES

Chula Vista, Calif., Junior High School

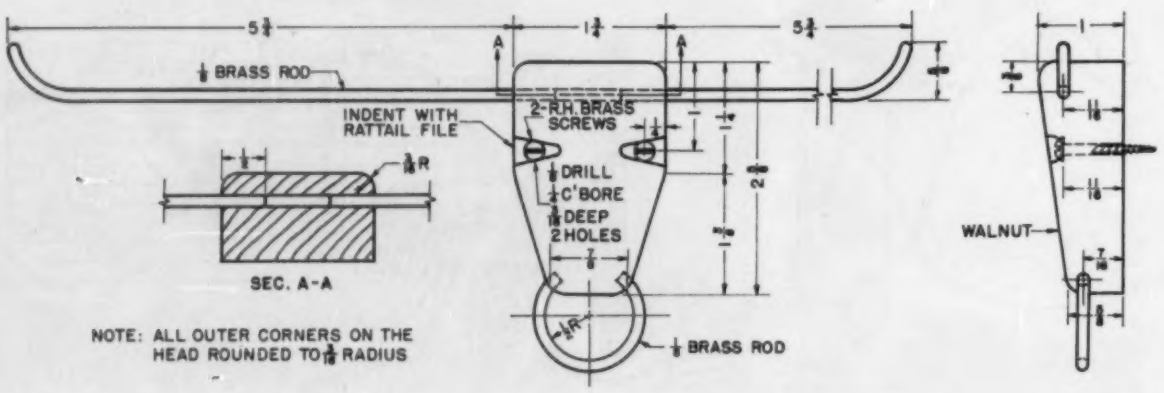
Need a good project for your students? Try this tie rack if you are looking for a project which combines economy of material, many different work processes, and uses both wood and metal in its construction. You will find that the western motif provides a lot of student interest. What is more, each bright brass and dark walnut tie rack should have a handsome and genuine "store-bought" appearance when finally completed.

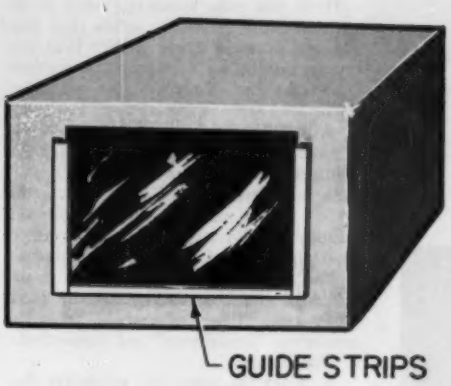
Construction should start with a rectangular block of walnut large enough to form the head. Locate and drill the holes for the eyes and the horns before any shaping takes place. The holes for the horns should be drilled 3/32 in. in diameter to allow for a tight friction fit of the horns later on. Counterbore the holes for the eyes carefully so both will be of equal depth. Now cut the block to shape and sand to a fine smoothness. Locate and drill the 1/8 in. diameter holes for the nose ring.

Apply the finish to the block before any assembly takes place. A dark stain and filler will probably look best. Try two or three coats of sealer, varnish or lacquer as a final finish, rubbing down the surface carefully after each coat has been applied.

The horns and nose ring are made of 1/8-in. brass welding rod. Cut the horns to length and then file one end of each piece to a square shape back the distance it will fit into the wood. This will keep the horn from turning once it is fitted in place. Drive the horns into place before bending the ends into the proper shape. Form the nose ring and fit it into place.

All the brass parts should be polished now, including the heads of the brass mounting screws which serve as eyes. To keep the brass nice and shiny apply a coat of metal lacquer.





A SHADOW-BOX APPROACH TO DETAIL DRAWING

HENRY HANSEN
Marinette, Wis.

The difficulty of teaching architectural drawing detail work can be simplified by the use of a shadow box. This box can be made to any convenient size to fit your own specifications. It can be used for a wide selection of any type of drawings in which you build up the problem step by step.

The Stair Problem

As an example of utilizing this technique, let's try working out the stair problem. Make an outline sheet giving the parts of the stair problem that you wish to cover. Go over this sheet with the class and discuss the steps necessary to drafting the problem. Teach the part and function of each part as you build up the problem in the shadow box according to steps outlined on worksheet.

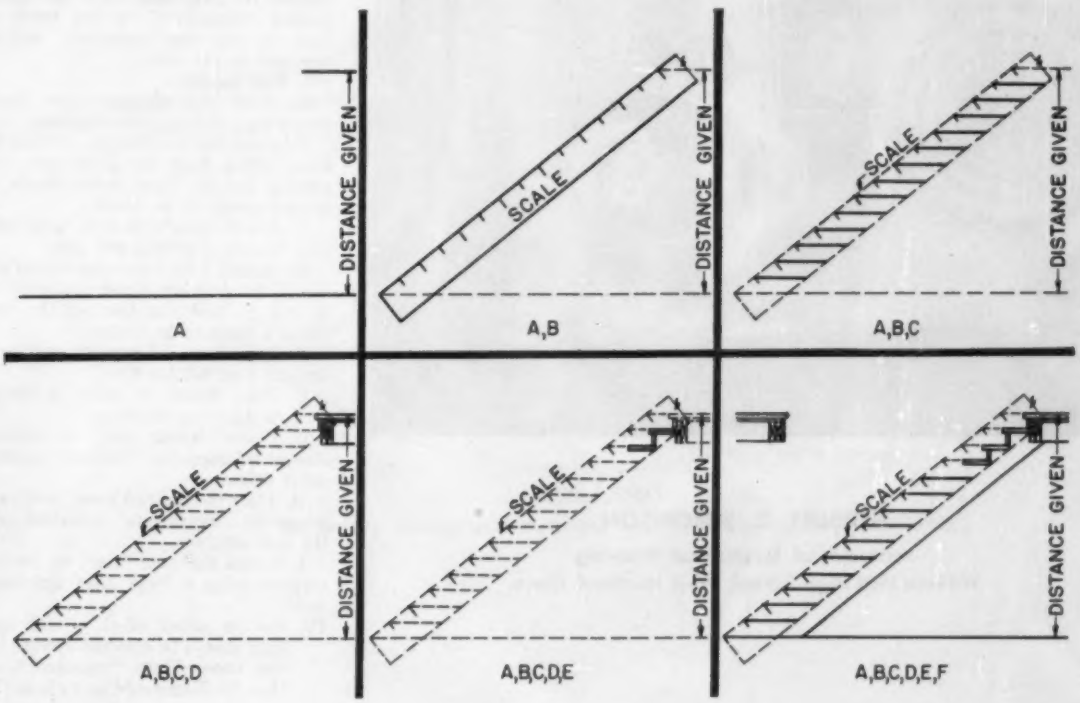
After this you may either have the students work from the worksheet or from inserting the tracings in the shadow box as needed. (Working from the tracings in the shadow box is very helpful for slow students.)

I use an enlarged drawing that students may refer to when needed.

Specific details of nosing and types of buildup are referred to textbook material.

Mimeograph Material

1. Place paper horizontally.
2. Scale — as large as possible.
3. Obtain the dimensions for distance from the top of one floor to top of next floor (different for each student).
4. Draw (A) lines to represent the floor levels.
5. Determine how many risers are needed. To determine how many risers are needed divide the height from floor to floor by 7½ in. If this does not come out a whole number you must increase or decrease the height of the riser slightly. Do not make the riser more than 8 in.
6. After (B) determining the number of risers needed, lay out that many spaces between floors; make all the spaces equal. This will give the top of each tread.
7. Draw (C) the details of the upper floor and top tread, finished floor, rough floor, joists, and riser.
8. Draw (D) in all treads and risers. Work out width of tread. For a stairway that is comfortable and easy to climb the sum of two risers and one tread should equal 25 in.
9. Work down to lower floor.
10. Draw (E) the stringer 12 in. wide. Draw the floor above for the stairwell. Be sure that the headroom will be 6 ft. 6 in., or more.
11. Label all parts with dimensions.
12. Title and name.
13. Have checked.



SOMETHING DIFFERENT FOR CHRISTMAS

HERBERT C. SIMONSON
Instructor of Mechanical Drawing
William Hall High School, West Hartford, Conn.

Have you ever wondered what to do with all those geometric solids your mechanical drawing classes make? Why not try incorporating them into a stylized Christmas tree? Your students will enjoy decorating and displaying their work and it will add a different touch of holiday.

Save the geometric solids as they are completed. Then paint them, each surface a different color. After that, the artists in the class can add traditional holiday motifs such as holly, candles, pine on one surface of the ornaments.

The following explanation deals in detail with the construction of the large paper cone "tree" into whose holes the geometric "ornaments" are suspended.

I. Ornaments

A. After the geometric solids are decorated, attach a 6-in. length of thread so that finished ornament will hang in attractive position.

II. Construction of cone

A. Join together six pieces of medium weight bristol board as shown in drawing. Make 2-in. overlapping joints: first gluing with rubber cement, stapling together, and taping with cellulose tape.

B. Lay out the development of the cone, getting the maximum size out of joined stock.

C. Lay out holes and cut away all waste stock.

D. Put the cone together using rubber cement, staples and tape.

E. Paint cone with gold paint.

F. Paint a 1-in. ring of rubber cement around each hole, sprinkling on silver glitter before rubber cement dries.

G. Paint the top 6 in. of cone with rubber cement, sprinkling on silver glitter before cement dries. Make the edge of the cemented area irregular.

H. Attach decorated "ornaments" to "tree." Place larger "ornaments" at bottom of tree, then tape the thread holding "ornaments" to the inside of cone so that the "ornament" will be centered in the hole.

III. Tree Support

A. Make two elliptical base pieces, gluing and nailing them together.

B. Make the upright post, drilling the holes which hold the angel hair supporting dowels. These holes should be spaced about 12 in. apart.

C. Attach upright post to base, using long screws or dowels and glue.

D. Attach 1 by 2-in. cross supports as shown on drawing. Cross supports can be cut so that the base of the cone forms a circle or an ellipse.

E. Paint base and exposed portion of upright post flat black.

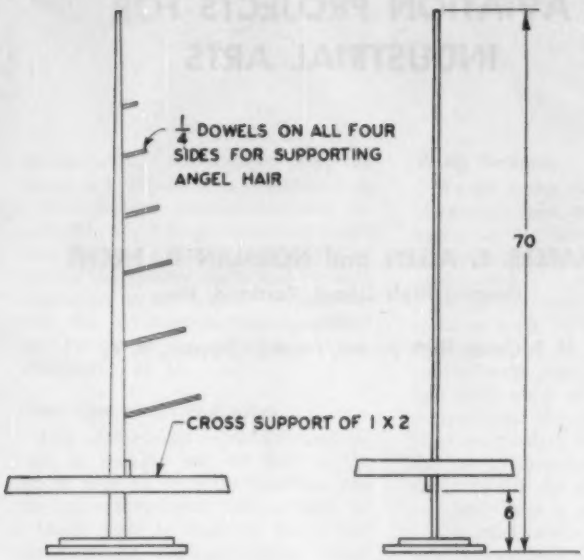
F. Place dowels in holes in upright post as shown on drawing.

G. Cover dowels with a generous amount of angel hair, forming a cone of angel hair.

H. Place the finished cone "tree" with geometric "ornaments" attached over the tree support.

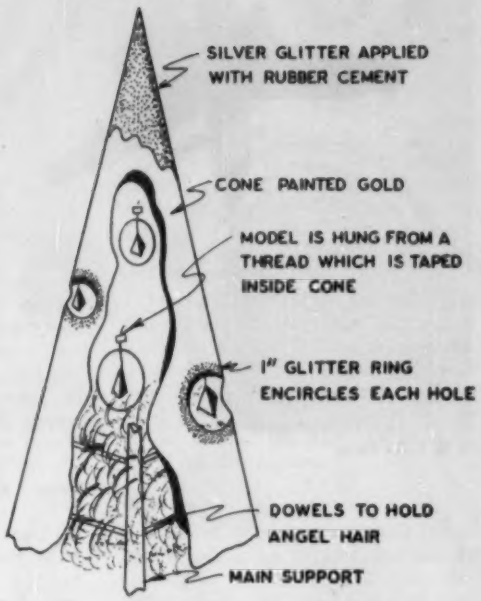
I. Fasten the cone "tree" to the tree support using 8 large head upholstery nails.

IV. For an added effect, a soft spotlight should be directed upward into the cone. Each "ornament" will then be illuminated in its hole.

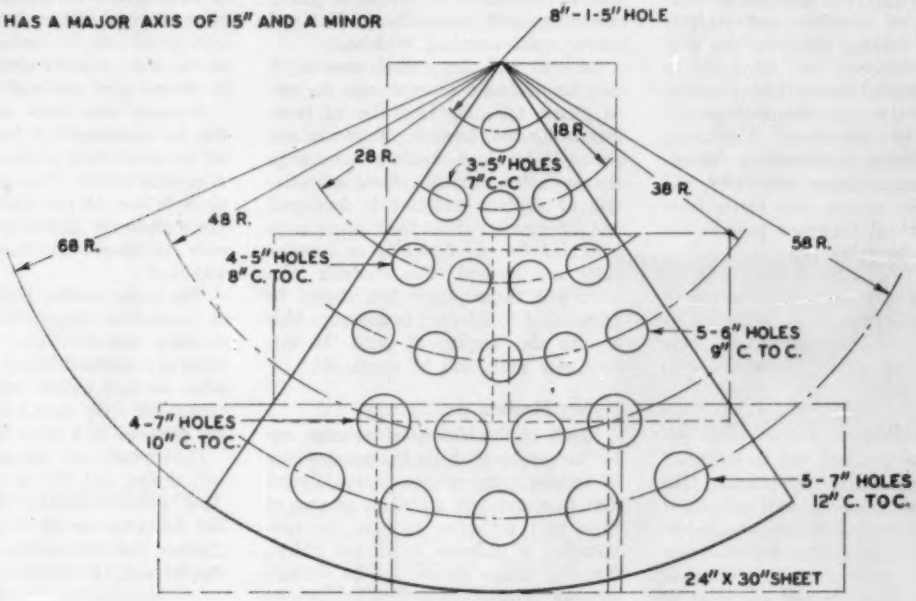


MAIN SUPPORT

THE BASE IS MADE OF 2 PCS. OF ¾" STOCK CUT IN THE FORM OF AN ELLIPSE. THE BOTTOM ELLIPSE HAS A MAJOR AXIS OF 18" AND A MINOR AXIS OF 12". THE TOP ELLIPSE HAS A MAJOR AXIS OF 15" AND A MINOR AXIS OF 9".


SILVER GLITTER APPLIED WITH RUBBER CEMENT
CONE PAINTED GOLD
MODEL IS HUNG FROM A THREAD WHICH IS TAPED INSIDE CONE
1" GLITTER RING ENCIRCLES EACH HOLE
DOWELS TO HOLD ANGEL HAIR
MAIN SUPPORT

CUTAWAY VIEW SHOWING INTERIOR OF TREE



CONE LAYOUT

SIX SHEETS OF 3 PLY BRISTOL BOARD ARE FASTENED TOGETHER AS SHOWN.

— U. S. Air Force

AVIATION PROJECTS FOR INDUSTRIAL ARTS

CHARLES S. ALLEN and NORMAN D. HECHT
Deering High School, Portland, Me.,
and
H. F. Carey High School, Franklin Square, N. Y.

The purpose of this article is to aid the shop instructor in introducing aviation education activities and projects to augment existing industrial arts programs. No attempt will be made to cover all areas of instruction or special units. Only the comprehensive general shop will be considered. This shop usually includes woodworking, metalworking, transportation, electricity, and drafting. The general shop varies from school to school from one part of the country to the other.

It is not considered that aviation should be taught as a special course or unit, but rather that it be related to as many subjects as possible. In this way industrial arts makes a definite contribution.

Model Building

This is an excellent way to introduce shop students classes to aviation. The activity can become a part of almost any area or level. However, woodworking lends itself to this work better than some of the others. A great range of models can be used. The nonflying or static models are more popular with some students, while flying models appeal to those who are older and more skilled.

Static Models

Static models are nonflying. Some students find stimulation and satisfaction in making scale models of favorite airplanes for display purposes. A few will be interested in historical planes and others will choose the present and future space traveling vehicles.

At first, with the younger student, it may be advisable to encourage the use of plastic assembly kits. Use of these kits is limited, however, since the experiences involved do little more than develop assembly skills. Some appreciation of airplane structure is developed and information about basic plane parts is gained, but no designing or creative skills are learned. The students who start with these plastic kits should be encouraged to advance to models which involve the shaping of parts. In this way new skills will be developed.

Flying Models

Much of the history of aviation can be learned by studying the construction of various flying models. It would seem best to spend only a limited amount of time with activities such as the construction of balloons, kites, and gliders, but this phase should not be entirely ignored. Flight characteristics can be carefully studied with gliders, which serve as a good springboard to power models. Even the lowly paper dart can be used to illustrate the controls necessary for satisfactory flight. Gliders can be simple such as balsa kits or elaborate, built-up models depending on the ability of the student and the time and equipment available.

From the glider, some students could be encouraged to advance to models powered by rubber bands. A great variety of kits is available and some of the more capable students will want to design and construct originals.

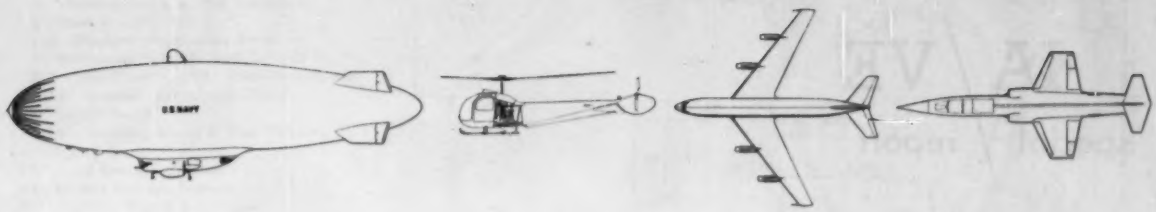
Students who show special interest can be encouraged to join model clubs or to enter their projects in competition with others. The PAA-Load program is one of the events that offers great challenge and worthwhile experience to those who have ability and ambition.

The more capable boys will progress to gasoline or, more correctly, to reciprocating engine-powered models. More recently, model-building supply shops offer jet and rocket engines. Some of these are CO_2 capsules, while others are powered with solid fuel propellants.

Occasionally an outstanding student will design and fly an original model. This should certainly be encouraged, but for most the kit is by far the best medium for stimulating and maintaining interest in aviation.

Experiments

While science courses lend themselves "naturally" to experimental activities, in industrial arts aviation education there should be a limited amount of this work. This does not mean that each student should be required to do a prescribed set of experiments, but rather to have group or instructor



demonstrations. For example, if a wind tunnel is available or is constructed as a shop project, several interesting experiments might be performed on model wing shapes. As a guide to this type of activity the teacher might find valuable suggestions in the booklet, *Demonstration Aids for Aviation Education*, Civil Air Patrol, Bolling Air Force Base, Washington, D. C.

Mock-Ups and Cut-Aways

Two of the most successful methods used in training our air men during World War II were the mock-up and the cutaway systems. Various parts of a plane, built in mock-up, introduced the crews to simulated flight. Many cutaways were used to demonstrate the action of parts within an engine.

A scale working model or the moving parts of the machine could be used in the industrial arts shop to stimulate an interest in a particular project. A reciprocating engine, made of plywood, wire, battery, and a bulb would, by a few turns, demonstrate the four-stroke, five-event cycle — the bulb lighting at the moment of ignition.

Other mock-ups and cutaways of this type could be made to demonstrate the other designs in the reciprocating engine. For example, radial, inverted in-line, horizontal opposed, and others. These would clearly illustrate their differences.

A small model air craft could be used to demonstrate the controls of an airplane, showing how the ailerons, elevators, and rudder operate while the craft is in flight, as well as in landing and taking off. This demonstration would take place in a wind tunnel constructed for this purpose.

Lubricating and Cooling Systems

A cutaway of an engine with the lubricating system exposed would demonstrate quite clearly the engine saving qualities of the system.

An engine when allowed to run for a length of time heats to the point where the internal parts could be damaged. In order to prevent this, a cooling system is added to the engine. A cutaway of the various cooling systems showing the path that the air or water takes would show how the heat of an engine is carried off.

Wing Designs

We all accept the fact that an airplane must have wings in order to fly. Many of us, however, have little or no understanding of the actual function of the wing.

To rectify this, many wing designs could be made by the boys in the shop and tested in the wind tunnel. After testing in the wind tunnel, the boys will find that some of the wings are so designed that they appear to be streamlined and modern but may have missed the most important function of the wing: to lift the plane off the ground and help keep it in the air.

Also show how a wing is designed for specific purposes. Small models of a piper cub, transport plane, fighter plane, bomber, etc., will serve to demonstrate the differences of their wings.

Fuselage

As we delve deeper into this air age, we find the fuselage design must also be adjusted to fit the swifter method of travel. Here again the changes in the design depend entirely upon the function of the craft. The faster the craft will travel the more streamlined it must be to reduce air friction. The heavy transport carriers need not go to the same extreme as the fighter plane, for their purpose is to haul great loads and need great lift and storage area.

Jet Engines

The coming of the jet age has caused many people to raise the question of safety in the air without a propeller. A cutaway of the various jets and even a mock-up demonstrated in the wind tunnel would clearly show the action of the jet and the resulting thrust of its engines.

Rockets

A rocket demonstration could be set up by making an airplane that has an opening in its tail. A small CO_2 cartridge could be placed within the opening. If the plane were attached to a guide wire it would fly through the air when the cartridge is punctured.

If a cutaway of the jet and the rocket engine were to be put side by side the difference between the two would immediately become obvious to most of the boys (jets depending on the atmosphere for its air supply while the rocket has its air supply self contained, allowing it to travel far beyond our atmosphere).

For your listing of free or inexpensive air/space age pamphlets, booklets, charts, pictures, films, etc., available from the best sources, write for this **free** booklet to the National Aviation Education Council, 1025 Connecticut Ave., N.W., Washington 6, D. C.

IA/VE
special / report

▶ the story behind the planning of a comprehensive general laboratory on the college level —

A Varied Approach to Teacher Training Facilities

CARL E. FRANKSON

The demand for industrial arts teachers in New Jersey, as well as in the nation, rose sharply following World War II. During the nineteen thirties and early forties, New Jersey graduated approximately 40 industrial arts majors each year. The supply equaled the demand.

Following the war enrollments in industrial arts on the college level, they increased about 50 per cent. Most of the men were ex-servicemen. The graduates about equalled the demand until 1952. For some unknown reason industrial arts enrollments then began to fall rapidly. New public schools were built in greater numbers following the war than at any other comparable time in history. Most of these schools provided for the inclusion of industrial arts laboratories on the junior and senior high levels. Many schools provided for elementary laboratories also. The increase in school enrollments, particularly on the elementary level was so great that many of these planned industrial arts laboratories were converted into classrooms even before they were in operation. It is doubtful if many of them will ever be reconverted into industrial arts laboratories.

Dr. Frankson is chairman of the industrial arts department, Montclair State Teachers College, Upper Montclair, New Jersey.

An architect's sketch of the exterior of the Fine and Industrial Arts Building of the Montclair, N. J., State Teachers College

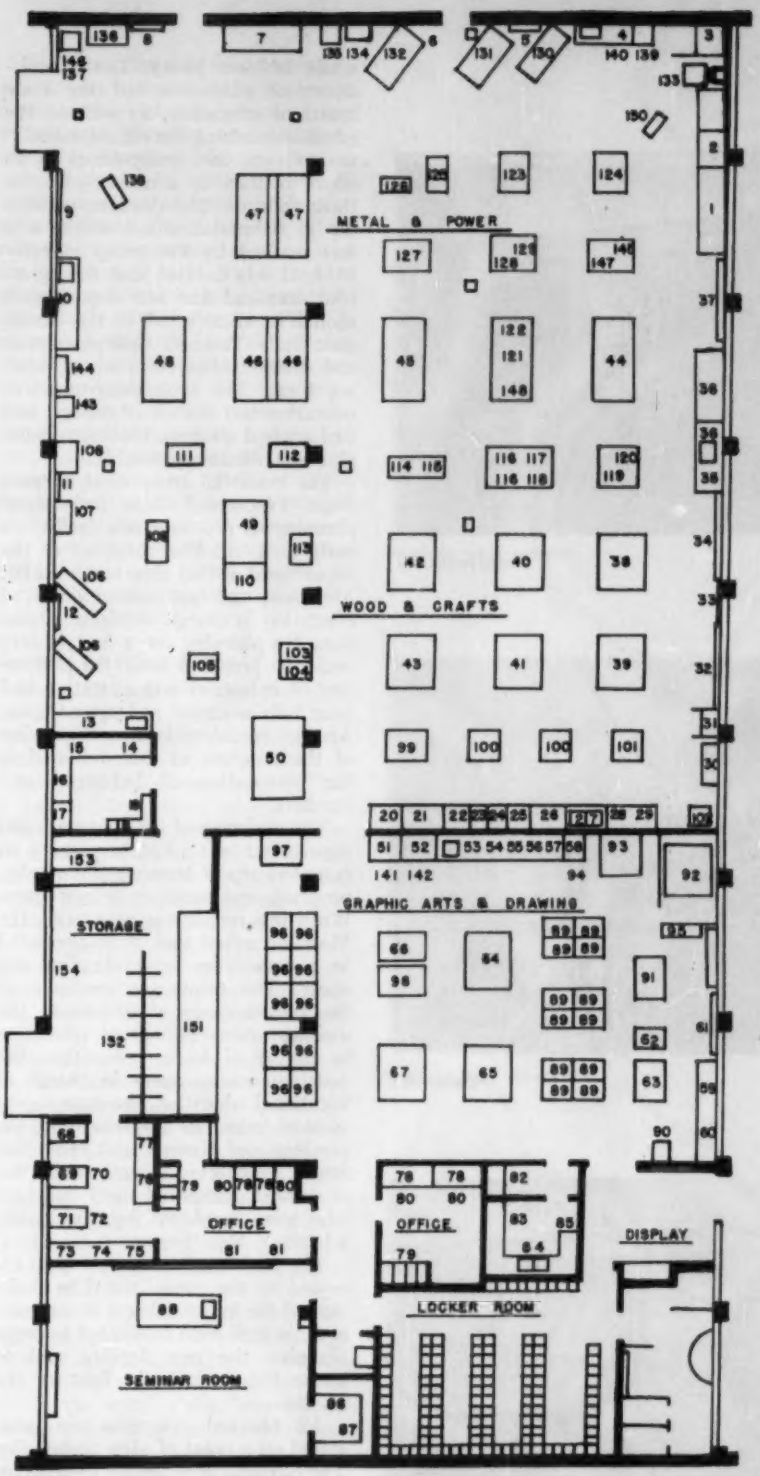
New Jersey realized that college facilities for the preparation of teachers, as they existed in 1940, would not produce enough teachers to provide for the needs of its public schools. The state department of education was one of the first to realize this and furnished the leadership for a state referendum calling for 15 million dollars for new construction of teachers college facilities in 1951. This money was to be allocated to six teachers colleges based on needs. The referendum was successful and the money was provided in 1952.

Industrial arts education was introduced on the college level at Newark State Teachers College in 1927. At that time it was called "manual training." The laboratories, if they could be called that, were located in what had been locker quarters for the men and women of the college. The program consisted of woodworking and drawing. Additional classrooms were converted into industrial arts laboratories as the program expanded. These facilities were inadequate to meet the needs for the education of industrial arts teachers. Many attempts had been made to provide the types of laboratories needed, but each time some circumstance such as the depression, interfered and therefore, no new facilities were provided.

Re-evaluation Needed

The passing of the referendum in 1952 now made it possible to rethink and evaluate teacher education as a

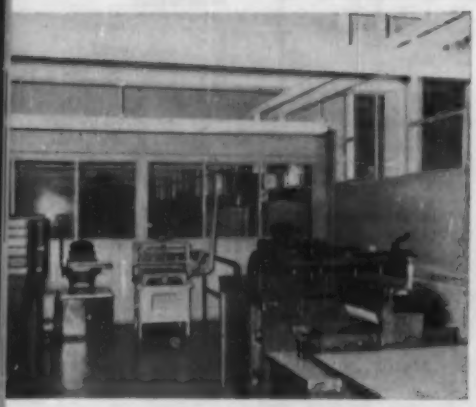
1 Soldering Bench & Wall Cabinet
2 Foundry Bench & Wall Cabinet
3 Welding Bench & Wall Cabinet
4 Heat Treating Bench
5–6 Machine Accessories Panel
7 Mechanics Bench & Wall Cabinet
8–9 Tool Panel 10 Chemistry Bench
11–12 Machine Accessories Panel
13 Utility Bench
14–16 Finishing Bench & Wall Cabinet
17 Spray Booth
18 Paint Storage Cabinet
19 Project Storage Cabinet
20 Lapidary Bench & Storage
21–22 Wedging Table
23 Knee Space Under Top
24 Ceramics Bench & Storage
25 Knee Space Under Top
26–27 General Unit (Refrigerator & Sink)
28–29 Drying Rack & Bench
30 Glaze Bench & Wall Cabinet
31 Spray Booth 32 Tool Panel
33 Blackboard & Screen Unit
34 Tool Panel
35 General Unit (Oven & Sink)
36 Textiles Bench & Wall Cabinet
37 Tool Panel
38 Leather Bench & Storage
39 General Crafts Bench & Storage
40 Plastics Bench & Storage
41 General Crafts Bench & Storage
42–43 Woodworking Bench & Storage
44 Metalworking Bench & Storage
46 Electrical Bench & Storage
47 Mechanics Bench & Storage
48 Experimentation Bench
49 Utility Bench & Storage
50 Glue & Wood Shorts Bench
51 Photostat Bench & Storage
52 Blueprint Bench & Storage
53–54 Silk Screen Bench & Storage
55–56 Drying Cabinet & Storage
57 Filing Cabinet
58 Pilot Press Bench & Storage
59–60 Bookbinding Bench & Storage
61 Tool Panel 62 Proof Press Cabinet
63 Etching Unit
64 Rubber Stamp Bench & Storage
65 Block Printing Bench & Storage
66 Mimeograph Unit
67 Planning Bench & Storage
68 Hardware Storage
69 Small Parts Storage
70–77 General Supplies Storage
78 Instructor's Desk
79 Filing Cabinets (Legal Size)
80 Desk Chairs 81 Side Chairs
82 Loading Room Bench & Wall Cab.
83 Printing Bench & Storage
84 Developing Bench & Wall Cabinet
85 Printing Bench & Storage
86–87 Visual Aids Storage Cabinets
88 Demonstration Bench
89 Composing Benches 90 Stapler
91 Imposing Stone 92 Platen Press
93 Paper Cutter 94 Pilot Press
95 Galley 96 Drafting Tables
97 Tracing Table
98 Multilith Machine Unit
99 Lapidary Unit 100 Potters Wheel
101 Kick Wheel
102 Kiln (18" Electric Upright)
103 Belt Sander 6" Foor Model
104 Disk Sander 15" Floor Model
105 Surfacer 18"
106 Woodturning Lathes 10"
107 Shaper (½" & ¾")
108 Drill Press 15" Floor Model
109 Jointer 6"
110 Circular Saw 10" Tilting Arbor
111 Band Saw 14" Wood and Metal
112 Scroll Saw 24" Floor Model
113 Tool Grinder 10" Pedestal Type
114 Drill Press 15" Bench Model
115 Scroll Saw 24" Bench Model
116 Buffer & Polishing Units
117 Utility Grinder 7" Bench Model
118 Disk Sander 12" Bench Model
119 Heavy Duty Sewing Machine
120 Light Duty Sewing Machine
121 Sheet Metal Bench
122 Metal Brake 24" Bench Model
123 Milling Machine 124 Shaper 7"
125 Band Saw 14" Wood & Metal



126 Power Band Saw (Metal)
127 Squaring Shears 36"
128 Ring and Circle Cutter 24"
129 Rotary Machine
130 Spinning Lathe 9" with Cabinet
131–132 Machine Lathe 10" with Cabinet
133 Foundry Unit (#10 Crucible)
134 Grinder 10" Pedestal
135 Drill Press 20" Floor Model
136 Spark Tester & Analyzer
137 Grease Cart & Gear Lube
138 Hyrdaulic Jack 1¼ Ton Capacity
139 Forge (Gas Model with Blower)
140 Heat Treating Furnace
141 Photostat Machine
142 Blue Print Machine
143 Variable Voltage Panel
144 Power Distribution Panel
145 Metal Bender 9" Radius
146 Electrical Test Bench
147 Rod Partner ⅜" Rod Capacity
148 Slip Rolls 30" 22 Gauge Capacity
149 Arc Welder 250 Amp.
150 Anvil (90 lb.)
151 Metal and Paper Storage Cabinet
152 Wood Storage Rack
153 Plywood & Sheet Metal Storage
154 Project Storage

woodworking

ceramics



graphic arts

whole in New Jersey. The commissioner of education and the state board of education, as well as the administrators of the six state teachers colleges, met many times in an effort to draw up a master plan for these colleges. The decision pertaining to industrial arts and fine arts was reached by the group in early 1953. It was decided that the industrial arts and fine arts departments should be transferred to the Montclair State Teachers College campus and should be housed in a new building there. The state department of education had alerted all colleges and had advised all departments to begin planning whenever possible.

The industrial arts staff at Newark State Teachers College had begun planning its proposed new facility as early as 1950. The chairman of the department at that time met with Dr. Morrison, assistant commissioner of education in charge of higher education. No planning for a new facility could be prepared until the philosophy of industrial arts education had been fully reviewed and agreed upon. Another consideration was the review of the program as then followed in the preparation of industrial arts teachers.

The chairman of the industrial arts department was asked to prepare an extensive report covering philosophy, program, and needs as he saw them. When this report was completed, Dr. Morrison asked that it be presented to a committee for evaluation and study. The committee consisted of the commissioner of education, the assistant commissioner of education in charge of higher education, the assistant commissioner in charge of vocational education, the state supervisor of industrial arts education, the presidents of Newark and Montclair State Teachers Colleges, and two prominent industrial arts teachers who were employed by the public schools of New Jersey.

The study and the report were accepted by the committee. The chairman of the industrial arts department and his staff were instructed to begin planning the new facility and to revise the program in light of the revision.

All planned programs are predicated on a point of view philosophy. The physical facilities are an outcome of the philosophy.

Planning for General Laboratories

Ever since the inception of the manual training program in the eighteen seventies, teachers had been prepared on the collegiate level through unit laboratories. Upon graduation many were asked to teach in general laboratories. This appears to be the reason why general laboratories have been so slow to develop; the new philosophical point of view adopted by the industrial arts staff at Newark would require a different approach to the preparation of industrial arts teachers on the college level. The old adage "they teach as they were taught" received considerable thought.

Why not plan one large comprehensive general laboratory for the new program? This type of preparation would undoubtedly instill the general laboratory ideal and would give the men an opportunity to actually work in the atmosphere of a general laboratory for the four years. Then, if the old adage is correct, we would have achieved our objective.

The next step was to prepare a list of probable areas to be included in the new program of industrial arts. When this was completed, it was decided to make scale models for all equipment, including desks, benches, and cabinets. The majors from the junior and senior classes volunteered to construct them. A scaled floor plan was laid out and the scaled models placed on it. Dr. Arthur Earl and Dr. George Ditlow of the industrial arts staff spent many hours in getting the final plan in readiness.

When we had achieved what we thought was the ideal plan, blueprints were mailed to many industrial arts authorities in the United States which included Dr. John R. Ludington, then specialist for industrial arts for the United States Office of Education; Dr. Gordon Wilber, director, division of industrial arts teacher education, State University of New York, Teachers College, Oswego, New York; Dr. Lee Hornbake, head, industrial education, University of Maryland; Dr. Burl Osburn, chairman, department of industrial arts education, Millersville State Teachers College, Millersville, Pa., and many others. Several letters were received from these men after they had had time to study and evaluate the plan. Many of their ideas were incorporated into a revised drawing of the facility.

The industrial arts supervisors of New Jersey were called to a conference in March, 1953, by John McCarthy, the assistant commissioner in charge of vocational education. The purpose of the conference was to see the scale model of the proposed college facility and to hear the chairman of the industrial arts department from Newark explain the new program and facility. At the conclusion of the meeting, Armand Rehn, supervisor of practical arts in the Newark

schools and president of the New Jersey Vocational and Arts Association, of which the New Jersey Industrial Arts Association is a member, asked the city supervisors for a vote of confidence in the proposed plan. Unanimous approval was given.

Two written resolutions were also recorded. One resolution was to the effect that all new equipment for the proposed laboratory be of the best quality and of the latest type. The second resolution stated that this laboratory should be as complete as possible and the latest materials should be used in order that the superintendents, principals, and school board members could use it as an exemplary setting for planning local laboratories.

Planning Conferences

Several conferences were held by the industrial arts staff and representatives of the architect who was selected to build the new building. Detailed plans pertaining to the cabinets, work benches, and equipment in general were discussed. Following this phase of planning, the staff worked with the architect's representatives on electrical and plumbing facilities. Final plans were completed by late 1953. Actual construction was begun in October of 1954 and accepted by the state in October, 1956 although a great deal of work was still to be done.

The physical facilities are important and determine to a large extent the program which can be developed. This was taken into consideration by first determining the objectives of industrial arts and what was to be taught and then organizing this body of content into teaching units or areas.

A great deal has been heard about general education and "common learnings." Many schools have now adopted core curriculums or similar plans in an effort to teach children through large units of work which cuts across traditional subject matter lines.

Industrial arts traditionally has been taught in units. These units have consisted of woodwork, metalwork, drawing, machine shop, and printing, to name but a few. The unit laboratory and the unit approach are prevalent in many schools today. The general or comprehensive laboratory, however, has been gaining popular acceptance especially in the last two decades. This would indicate that industrial arts teachers also are endeavoring to teach in an environment that is conducive to the broader development of children through activities not limited to one area.

The youngster may be constructing a lamp, for instance, made of several media and which incorporates many techniques. Planning and construction are important. In the general shop, however, he is not limited to these two phases of learning. He may be studying lighting, and the planning and constructing of the lamp are contributing to his understanding of lighting principles and how it affects the health of everyone. This is learned through the use of such instruments as the light meter, ammeter, and ohmmeter. He may compare the cost of operation of the fluorescent light as against incandescent light. Through research and the study of lighting he will learn about the mercury-vapor light and others; where they are used and the reasons for their use in these particular places. This type of teaching is in accord with recognized general educational philosophy.

General Learning Areas

This philosophy became the basis for the planning facilities for collegiate preparation of industrial arts teachers.

Six broad areas were planned. This is comparable to three general shops consisting of two areas each. These areas are graphic arts, planning and drawing; woodwork and arts and crafts; and transporation, communication; and power, and metals.

The graphic arts, planning and drawing area requires a dust free condition. It was decided that this area should be somewhat enclosed and away from the other general areas. This was accomplished by a glass partition. The other areas were organized, as if they were unit laboratories, the only difference being that partitions were not added.

The curriculum at Newark State Teachers College was on the unit laboratory basis. The new curriculum at Montclair State Teachers College is based on the general laboratory approach.

In the first semester of the freshman year graphic arts, planning and drawing and industrial arts orientation are offered. In the second semester the work is the same except for the dropping of the industrial arts orientation.

The work offered in the first semester of the sophomore year consists of woodwork, arts and crafts, transportation, communication, power and metals. By the end of the first semester of the sophomore year all the majors will have worked in all areas. Beginning with the second semester of the sophomore year they will begin going through all of the areas again.

metals and power

metals and power

transportation

This may be thought of as advanced work in these areas.

Some of the men may want to broaden their backgrounds in some special area such as graphic arts, auto mechanics, or woodworking. This is not only possible but desirable. Each industrial arts major has 12 semester hours of electives. On the senior level he is encouraged to elect the special work that he desires. He may work in one area or in all areas as he wishes.

At Montclair each major from the junior class is assigned to a nearby public school for one month of observation and participation. This is usually on the elementary or junior high level. This educational experience is referred to as "junior practicum." On the senior level each major is assigned to a senior high school for a period of six weeks. This is called "senior student teaching." The men devote full time to the experiences and do not carry any college classes while out in the field.

All industrial arts classes meet for two periods of three hours each. Four semester hours are given for six clock hours of laboratory work. Fifty-three semester hours are in the major field, 48 in general education, 15 in specialized professional and 12 semester hours are for electives. These offerings total 128 semester hours. This constitutes the required hours for graduation.

How the Staff Functions

Some mention should be made as to how the staff functions in carrying out the program. This type of program requires a great deal more counseling and record keeping. Each new entrant is counseled in detail regarding his past performance. If he has had a rich background in drawing, woodwork, metalwork, or some other area, this is noted on a master record card. If the proficiency is proven, he does not need to repeat the work. He is given other work in its place which will challenge as well as broaden his basic skills. In the freshman and sophomore years the majors usually work in small groups of four or five. The instructor may individualize the work, but all groups will cover basic material.

The instructor will lecture and demonstrate to each group and then make basic assignments. Let us use machine drawing as an example. The small group will study gears and their uses. Technical terms will be defined and basic gear structure may be demonstrated on the blackboard. Each of the men will then be assigned problems according to background and needs. No two men will draw the same problem. The same procedure will be followed in other phases such as cams, screw principles, and assembly drawings.

The majors on the junior and senior levels may work in small groups or individually. The basic material may be given individually or by group lecture and demonstrations.

Another example of how instruction may be given, for example, is in the area of arts and crafts. The instructor has a record card which has recorded all the required crafts and any additional crafts which the student may study providing that he has the time and effort. Any student may begin any craft on any level that he chooses. The only requirement is that the required work be complete by the time he has completed the first semester of his senior year.

Individual record cards are kept on each individual and his progress. The students are also required to keep identical records.

It is hoped that this type of instruction will become so effective that it will be used in the public schools. If the old adage, "they teach as they were taught" is correct, then it may be assumed that the college is contributing to the proficiency of teaching and thereby is serving the state by developing the type of youngsters who will orient themselves and contribute to that way of life. ◀

INDUSTRIAL DESIGN

(Concluded from page 290)

both of which are evident in the preceding case histories.

1. Accepted definitions of industrial arts education imply, if not demand, an understanding of the designer's work. His influence on "taste," on manufacturing processes, and the application of new materials to industrial products is immeasurable. Industrial arts education can not claim to interpret industry or include a study of man's changes of raw materials and the results of these changes without a thorough study of industrial design. Incorporating study of industrial design in industrial arts education presents no serious problem of organization or administration. It requires only that the teacher adapt the designer's methods to his program. This adaptation suggests the second important contribution of industrial design.

2. It is reasonable to assume that project development in industrial arts could follow an approach similar to the one used in product development. The industrial arts student should be encouraged to sketch his ideas, to construct models and prototypes, and to revise his plans and procedures until the solution of his problem is evident in the construction of the final product. The industrial arts student should be urged, also, to research the tools and materials available to him in order to determine the construction methods and materials best suited to the solution of his problem. Design criteria and principles are concomitants of the method of product development in industry and should be treated similarly in industrial arts. Treating design criteria and principles as separate entities, or creating artificial design exercises to stimulate students, suggests the old exercise methods of the pre-industrial arts era of shop work and seem inadequate to a total industrial arts approach.

In order to develop a program, the teacher must have a background in design principles as well as a firm understanding of this particular method of creatively solving problems through manipulation of concrete forms and materials. The teacher needs to possess a searching, questioning attitude. He must be flexible. He will suggest modelmaking when it is necessary to the solution of the problem. He will foster research and testing of materials and processes only when there exists a real purpose. Similarly, he will discourage investigation of the obvious.

This method can be adapted to all grade levels. Naturally, it should be simplified for the lower grades. It should take a more complex direction in the higher grades. In any case, the student will be creatively engaged. He will be challenged to find new relationships. He will not be interpreting an industrial process but a vast industrial program embracing many areas and processes. In every sense, the student will be designing and manufacturing a product. ◀

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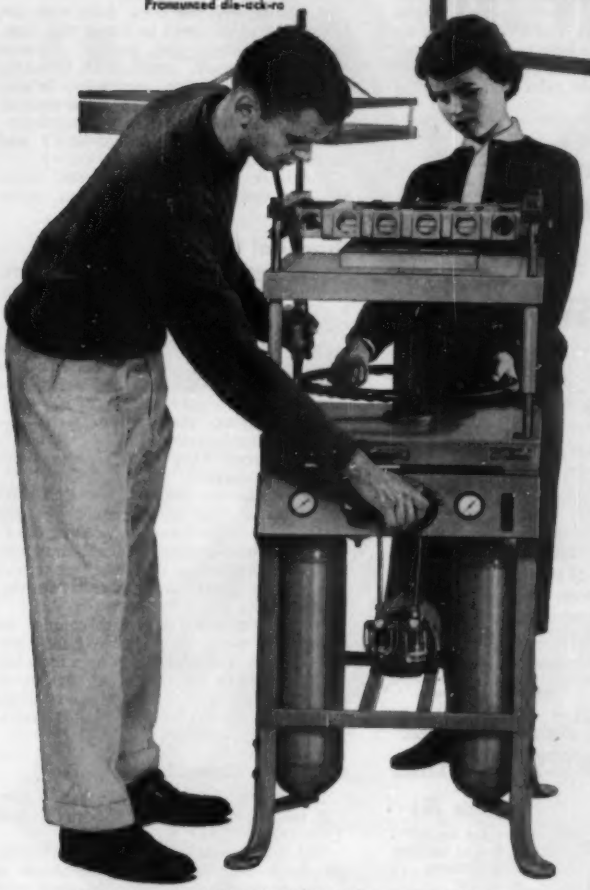

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new / books

Industrial Leadership

By C. A. Weber and John W. Karnes, Jr. Cloth, 226 pp., $5. Chilton Co., Philadelphia 39, Pa.

This book discusses the challenge of leadership in industry, the need for leaders today, the importance of teamwork, the effects of various situations on leadership, the risks that leaders must take, and resources and potentials of leaders in the light of their possible contributions to American business and industry.

The authors conclude that not only must management be concerned with upgrading employees to hold positions of leadership, but people in general in America must be convinced of the importance of keeping our economy free.

American Standard Illustrations for Publication and Projection

ASA Y15.1–1959, paper, 16 pp., 8¼ by 11 in., $2 a copy from the American Standards Association, 70 East 45th St., New York 17, N. Y., or from The American Society of Mechanical Engineers, 29 West 39th St., New York 18, N. Y.

The committee that prepared the standard included engineers, scientists, and graphic arts specialists representing a number of educational institutions and industrial organizations, technical societies, and publishers.

It is intended as a guide to help authors prepare clear and legible illustrations for technical papers and articles. The standard emphasizes that simplicity, legibility, and unity are essentials of charts and graphs intended for use as visual aids with an article or speech. To help technical authors achieve these objectives, the standard presents practical guide rules and illustrates how they are used to achieve effective visual aids.

An innovation is the functional, integrated system provided for use with a standardized draft form, which is illustrated in the standard.

Career Planning

By Leonard J. Smith. Paper, 263 pp., $3.50. Harper & Brothers, New York 16, N. Y.

This book is a result of 20 years of conducting group career planning and individual career counseling by the author. It brings together in one volume different phases of the subject that are important to the individual who is seeking guidance in selecting a career and to the teacher who is responsible for counseling.

In 18 chapters, the book deals with the different steps involved in career planning: aptitudes — manual and mental; interests — musical, literary, commercial; personal attributes; personality — maturity, habits; motivations and values; study and analysis of the career or occupation you are interested in; development of abilities; and career opportunities.

The book contains several tests, charts and questionnaires on which to judge oneself.

Graphical Communication

By Earl D. Black. Cloth, 328 pp., $5.75. McGraw-Hill Book Co., New York 36, N. Y.

This book presents the techniques used for technical drafting, blueprint reading and sketching to bring about communication between the designer, the technician, and the production supervisor.

Accompanying the text material are simplified explanatory drawings; highly technical terms have been replaced with selected illustrations.

Included in the chapters are discussions on freehand drawing, standard drafting practices, pictorial drawings, working drawings, machining processes, layout drawings, tool and die drawing, domestic architecture and design, and architectural drafting fundamentals.

Problems at the end of each chapter are designed to make the students think. Controversial questions have also been included.

The appendix of the book consists of tables, mathematical formulas, and factual information needed by the detailed draftsman and the technician.

Soldering Manual

Edited by Edward A. Fenton. Cloth, 170 pp. American Welding Society, New York 18, N. Y., $5.

The first manual on soldering published, this book completely covers all phases of soldering, combining the theoretical with practical.

The 21 chapters are all in standard format and deal with the following subjects: principles of soldering; solders; fluxes; joint design; precleaning and surface preparation; equipment, processes and procedures; flux residue treatment; inspection and testing; copper and copper alloys; steel; coated steels; stainless steels; nickel and high-nickel alloys; lead and lead alloys; aluminum and aluminum alloys; magnesium and magnesium alloys; tin; cast irons; precious metal coatings; printed circuits; and safety.

The manual is equally useful to the amateur and the professional. The latest soldering techniques are described and clear indications are given when to solder, what to solder, and how to solder. Detailed information is also given on the principles

(Concluded on page 20A)

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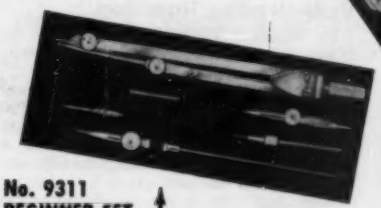

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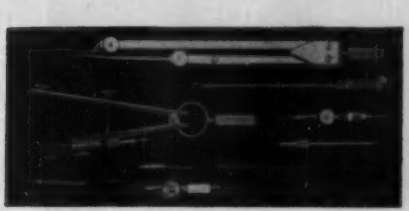

No. 2411
STUDENT SET
5¼" Combination Compass with divider, pen and pencil parts, lengthening bar; 4" combination bow pencil and pen; 4½" ruling pen; extra ruling pen handle; metal lead box; screwdriver. Per Set, $4.70.

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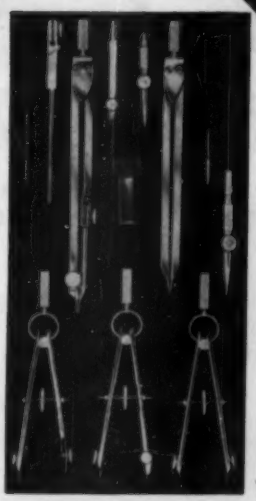

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(Concluded from page 18A)

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Blueprint Reading — Second Edition

By Fred Nicholson, Fred Jones, and Cavins Baughman. Cloth, 143 pp., 7½ by 10 in., illus., $4.20. D. Van Nostrand Co., Inc., Princeton, N. J.

In writing this book, the authors have endeavored to overcome some of the handicaps confronting the teachers of blueprint reading. The material and method of presentation are based upon years of experience in the field of vocational education.

The main body of this work consists of fifty lessons and fifty blueprints for study. In each lesson, something new has been added. Except for the last plate, each print has been considered as a separate unit. For this reason title blocks have been omitted. On many of the lesson sheets in this book, pictorial drawings are shown in addition to the working drawing. This is done here to help the student to visualize the object shown on the working drawing. Lesson material for sketching and clay modeling has been provided.

It is hoped that in addition to learning how to read a blueprint, the student of this text will be able to interpret the language of industry, and know what must be done in the shop to accomplish the purpose of the designer.

Plates numbered from 1 to 50A and 50B are contained in this book. There is an appendix also.

Machine Tool Operation, Revised Edition

By Henry D. Burghardt, Aaron Axelrod, and James Anderson. Cloth, 588 pp., illus., $8. McGraw-Hill Book Co., Inc., New York, N. Y.

This is the fifth edition, part one, of the two-volume *Machine Tool Operation* set. It is regarded as an indispensable reference and guide for machinists and others in the machine-shop field. An introduction to the book discusses the machinist's trade. Part I covers safety, measuring tools, bench work, the drill press, the lathe, and forge work.

Science Technology & Society

Paper, 24 pp. American Iron and Steel Institute, 150 East Forty-second Street, New York 17, N. Y.

A catalog of teaching materials for use in connection with film strips on science and technology as affecting social conditions.

Understanding Transistors

By Milton S. Kiver. Paper, 64 pp., 6 by 9 in., illus., 50 cents. Allied Radio Corp., Chicago, Ill.

This is the latest addition to the library of technical books published by Allied Radio Corporation. It serves as an excellent introduction to transitors, and is also a helpful reference for those already acquainted with the subject.

Beginning with a concise discussion of the properties of germanium, the opening sections of the book clarify important basic theory and provide a solid foundation for the succeeding chapters. Subjects covered include: atoms and molecules; the germanium atom; electrons and holes; current flow; junction transistors; drift transistors; tetrode transistors; alloy-junction transistors; surface barrier transistors; basic transistor amplifier circuits; power amplifiers, RF and IF amplifiers; transistor oscillators; silicon transistors, etc.

Many additional transistorized circuits, with detailed explanations included.

Handbook of Air Conditioning, Heating, and Ventilating

Edited by Clifford Strock and William B. Foxhall. Cloth, 1049 pp., 8¼ by 11 in., $15. The Industrial Press, New York, N. Y.

This book contains over 1000 large pages of technical information of great interest to engineers, contractors, researchers, teachers, and students, on air conditioning, air handling and ventilation, fuels and combustion, heating and heat transmission, piping and plumbing, motors and starters, mathematical data, and drafting room practice, and 13 pages of terminology.

The data collected by Clifford Strock have all been culled from his own personal experience and from material prepared by outstanding authorities. It is a book that will be be helpful to students, apprentices, journeymen, foremen, contractors, architects, and designers.

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CIRCULAR SAW
* WITH PATENTED RIP FENCE
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THE BULLETIN BOARD

(Concluded from page 5A)

rural schools can afford the staff, space, and equipment that is required by a normal distribution of vocational interests. If rural communities are to have the kind of vocational education they should have, the book concludes, certain changes such as the following are recommended:

- A general recognition that there is likely to be almost no market for unskilled persons in the next generations.
- Acceptance of the fact that this has become a nation devoted largely to industry and business; that the rural group is a small and declining part of the population (from one-half to three-fourths of rural youth will engage in other occupations outside the communities in which they have grown up).
- Public school buildings must be planned for the use of adults who are enrolled in vocational and other adult courses, as well as for children.
- Rural communities will provide counseling to help individuals plan a career program helpful to them.

MECHANICS COURSE DEVELOPED

A suggested course of study in agricultural mechanics to train pupils in skills needed by dairy farm operators was developed at a three-week workshop at Cornell University during the summer.

The course consists of jobs which will require using all of the time set aside for teaching of agricultural mechanics. Pupils, in addition, are expected to obtain practice on jobs at home under instruction of parents and teachers.

Developing a course in agricultural mechanics on a state level departs from established practice; formerly individual teachers have planned agricultural courses locally.

APPRENTICESHIP TRAINING MUST MOVE FORWARD

Apprenticeship training in the building industry must adjust to new techniques and new products if it is to survive in the coming construction boom of the 1960's, according to Douglas Whitlock, chairman of the board of the Structural Clay Products Institute.

He gave the warning at the North Central States Apprenticeship conference held recently in Washington, D. C., when he spoke to delegates from labor, management, state and federal government training agencies, and vocational educators.

Calling the "Joint Apprenticeship Committee" plan the best way to meet our man-power needs, Whitlock encouraged both labor and management to strengthen and increase these local groups. He urged the closest co-operation between the Joint Apprenticeship committees, vocational educators, and federal and state apprenticeship agencies. Vocational educators should make full use of related training materials and should provide the equipment and facilities necessary for their use, he said.

WELDING IN N. J. I-A CLASSES

After several years of not being offered in New Jersey High School Industrial Arts classes, welding training is being resumed in 21 high schools in the state.

In addition, welding is now included in the curriculum for all industrial-arts students at Trenton State Teachers College and their 1959–60 catalog lists welding for the first time.

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Iron Bender Bends

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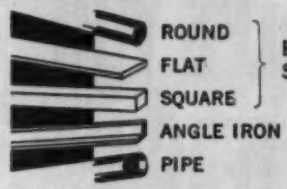

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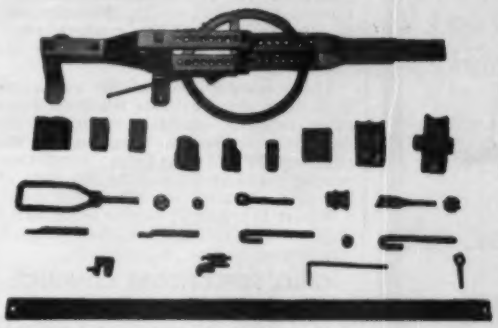

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BENCH MODEL $314.00
No. 654 — smaller version, 4 burners, 5" by 7¾" by 13½" firebox —
PEDESTAL $191.00
BENCH MODEL $165.00
(All Prices F.O.B. Factory)

Six No. 5, Type A Bunsen Burners give this versatile furnace a 400° to 1800° F. range. Temperatures easily controlled. Ratchet-operated door opens upwards. Use with natural, artificial, mixed or bottled gas. Economical and efficient with all. Firebox 7" by 13" by 16½". 78,000 BTU's per hour (natural gas).

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ASSOCIATION NEWS

(Concluded from page 12A)

followed, at which J. Lyman Goldsmith was the main speaker. Mr. Goldsmith is supervisor of the Los Angeles City Schools.

This was the first in a series of four meetings to be held by the association this year.

Ron Brown, Ballflower, is president of the association.

N. DAK. INDUSTRIAL EDUCATION ASSOCIATION

At the annual convention of the North Dakota Education Association in Bismark, N. Dak., on October 22, 1959, the section consisting of industrial arts teachers voted unanimously to form an organization to be known as The North Dakota Industrial Education Association. The association will be open to industrial arts teachers, vocational education teachers, and those interested in the group.

The primary purpose of the association is to bring about a closer relationship between industrial education teachers of the state and to promote programs for the improvement of academic instruction, teacher qualifications, and the expansion of industrial education throughout the state.

Robert Echelbarger, teacher of Industrial Arts at The Crippled Children's School, Jamestown, N. Dak., is president.

OHIO SUPERVISORS CONDUCT FALL MEETING

The annual fall meeting of the Ohio Supervisors of Industrial Arts was held at Fairmont High School, Kettering, on October 13 and 14.

R. S. McAllister, supervisor in Kettering, is chairman of the group, and R. O. Knight, Columbus, and William Mason, Cleveland, were discussion leaders. The theme of the meeting was the Industrial Arts Curriculum at the Secondary Level.

The 1960 fall meeting will be at Parma, Ohio, with H. J. Detrich the chairman.

NATIONAL CONFERENCE ON STANDARDS

Major General J. B. Medaris, Commanding General of the U. S. Army Ordnance Missile Command, spoke on "Standards for Survival" at the October 21st award dinner of the 10th National Conference on Standards. The conference was held at the Sheraton-Cadillac Hotel in Detroit on October 20, 21, and 22.

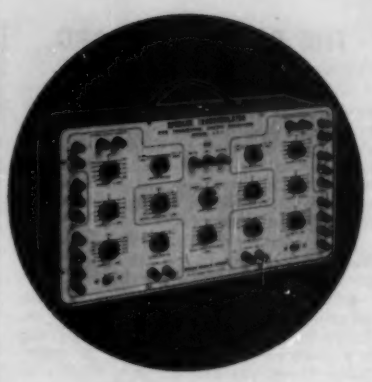
Relative merits of the inch and metric systems, value analysis in purchasing, automotive industry standardization and standards for materials handling, fastener industry and tool engineering were among the session subjects. A session on "New Horizons in Standards" included talks on nuclear energy, space technology and meteorology.

GRAPHIC ARTS COUNCIL BANQUET

Dr. Frank W. Hubbard, assistant executive secretary of the National Education Association of the United States, will be the main speaker at the Second Annual Awards Banquet of the Education Council of the Graphic Arts Industry in Washington, D. C., at the Mayflower Hotel, December 5, 1959.

NATIONAL ELECTRONICS CONFERENCE

The 15th Annual National Electronics Conference conducted their program October 12 to 14, 1959, at the Hotel Sherman, Chicago. Over 13,000 professional people concerned with latest advances in electronics attended.



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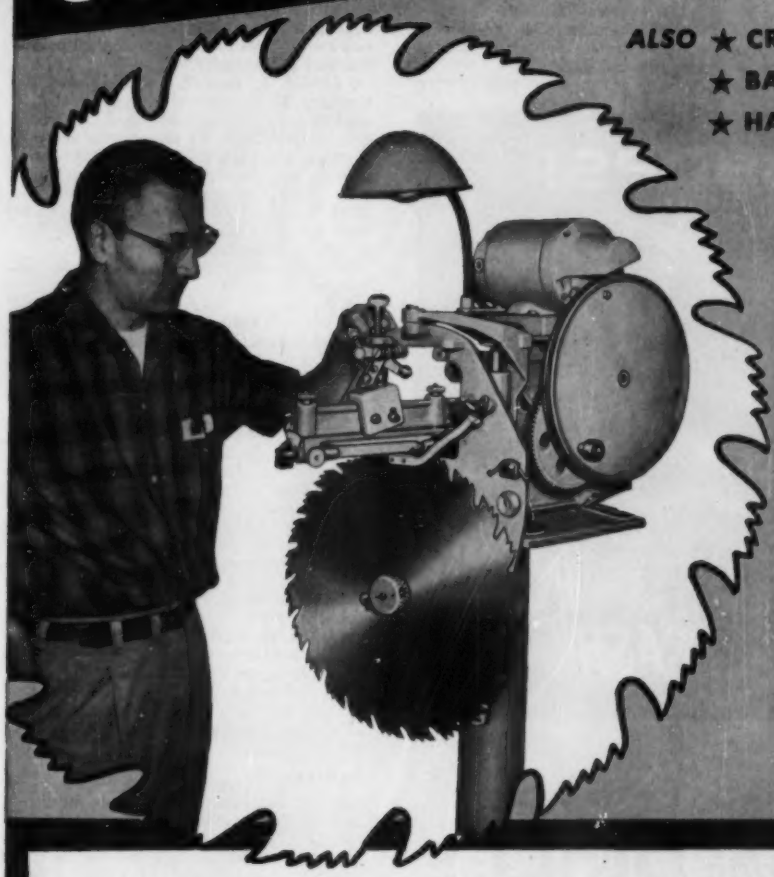


It's the new Model 200

FOLEY *Automatic* SAW FILER

THE NEW model 200 Foley Automatic Saw Filer is the *first* and *only* machine which will file the so-called "combination" (rip and crosscut) circular saws; also crosscut circular saws, band saws, all types of hand saws.

The Foley Saw Filer is doubly valuable in manual training departments—it keeps all your saws in perfect cutting condition at low cost and greatly prolongs their life; it also is a great asset for training students in the correct care and maintenance of both hand and power saws. With the Foley Saw Filer, the Foley Retoother (for hand saws) and Foley Power Setter, (last two not shown) you can sharpen *4 to 6 hand saws per hour.*

The exclusive Foley principle of jointing the saw as it is filed, keeps all teeth uniform in size, shape and spacing; it also keeps circular saws perfectly round. This assures a fast, smooth, true cutting saw that stays sharp longer, runs cooler, and frequently doubles the life of the saw.

30-DAY TRIAL OFFER

You may try the new Model 200 Foley Saw Filer in your own shop for 30 days. See for yourself its precision work, advanced design and quality construction—time-proved through more than 50 years manufacture and use of previous models. Write for literature and details of 30-day trial offer.

FOLEY MANUFACTURING COMPANY
3318 N. E. 5th St., Minneapolis 18, Minn.

personal / news

Appointments . . .

● **Frank E. Briley** joined the staff of the Industrial Arts Department at North Carolina State College, Raleigh, N. C., on September 1, 1959. He has the rank of instructor and teaches the General Woodwork and Tools and Materials courses, and supervises student teachers.

Mr. Briley replaces Robert L. Ford, who resigned to accept a position as Director of the Crafts Shop at Fort Bragg, N. C.

● **Stanley G. Hagen,** former Richmond, Calif., vocational education instructor, has recently returned to the United States from Brazil, where he has been serving with the International Cooperation Administration.

● **Dr. Walter S. Jones,** director of vocational teacher education, University of Pennsylvania, Philadelphia, Pa., has returned to Italy after a couple of weeks vacation in the United States.

Dr. Jones is on a two-year leave of absence from the University serving as a consultant for the European Productivity Agency in establishing vocational teacher education programs in Italy and Greece.

● **W. Carlisle Anderson** of the Industrial Arts Department at San Diego State College, San Diego, Calif., has been promoted to the position of associate professor.

● **John M. Fontana** has been elected president of the Printing Teachers Guild of New York, with Gerald J. Mallon as vice-president, Herman E. Soblick, treasurer, and Joseph Agnello, secretary.

The theme of the year's meetings will be "Today's Research in the Graphic Arts."

● **Dr. Elroy W. Bollinger** has been appointed director of industrial teacher training for the New York State Education Department. He succeeds Gilbert Weaver, who retired last July.

● **Raymond S. Klein,** B.S., M.S., in Industrial Arts from City College of New York, has joined the staff at Buffalo to teach woodworking.

Mr. Klein has served with the U. S. Navy and toured Southern Europe as a civilian. He has taught for three years at Children Center, N. Y., Home for Dependent and Neglected Children, and has come to State University College of Education from a New York City Junior High School woodworking position. His interests and hobbies include camping, oil painting, and photography.

● **Clifford E. Randall,** recently of Cattaraugus, N. Y., Central School, joined the staff at State University College of Education at Buffalo, N. Y., to supervise student teaching activities. His training and education include Oswego State Teachers College (B.S.), Syracuse University (M.S.), IBM Tool and Die School, DeVry Technical School, Chicago, and Courthouse Bay Engineers School, Camp LeJeune, N. C.

Mr. Randall was awarded a Fulbright Scholarship in 1959.

● **Dr. M. Ray Karnes,** chairman of the Division of Industrial Education, College of Education, University of Illinois, Urbana, was elected president of the American Industrial Arts Association for 1959–60. He will preside at the Toronto Convention in April, 1960.

● **George Spearman,** a former member of the staff in the industrial arts department at San Jose State College, has recently been assigned as vocational adviser to the Ministry of Education in Guatemala.

● **Robert Johnson,** also a former staff member at San Jose State College, has been in the Philippines for the past three years, and is returning to the mainland to matriculate at Stanford University as a doctoral candidate.

● **Ralph W. Sterling** has been appointed executive director of development and public relations at Illinois Institute of Technology, Chicago.

Most recently Mr. Sterling had served as vice-president of Pratt Institute, Brooklyn, N. Y.

Retirements . . .

● **E. J. Robinson,** supervisor of industrial arts in the Dayton, Ohio, public schools for many years, retired last June.

Mr. Robinson was honored by the state supervisors at a dinner on October 13, 1959, and again by the Dayton Industrial Arts Teachers on October 14.

James O. Reynolds succeeds Mr. Robinson as supervisor in Dayton.

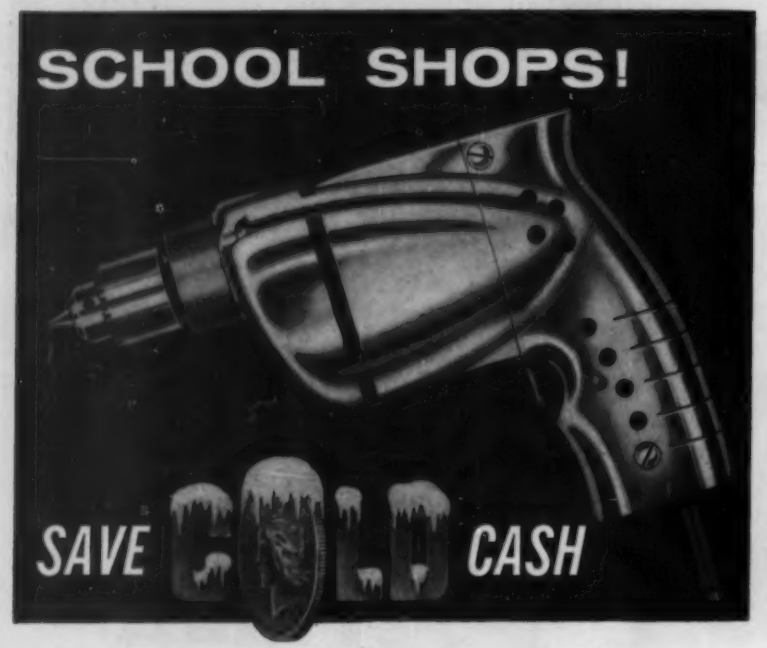
● **Professor Charles R. Kinison** retired from the faculty of the Ohio University, Department of Industrial Arts, in June of 1959. He served for over thirty years at Ohio University.

● **Chester L. Richards** of Kansas City, Kans., after 40½ years in the teaching field. His latest assignment was at the Argentine High School.

He was graduated from old Kansas City, Kans., High School in 1917, and attended Pittsburg State College for two years.

Mr. Richards has joined Baird Recreation Center where he will work with children as an instructor in bantam and junior bowling leagues.

In his new position he will direct areas of research and development in stress and structural analysis, automation, materials engineering, and dynamics and vibrations.



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E. James Livingston, District Audio-Visual Coordinator, Centralia School District No. 401, says:

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STANLEY SAW HORSE BRACKETS

A new sawhorse bracket has been developed that makes it possible to assemble a sawhorse in 30 seconds that will support a half ton.

Stanley Saw Horse Brackets

Using Stanley sawhorse brackets with dressed or rough 2 by 5-in. lumber makes it possible to quickly set up picnic tables and benches, tennis or model train tables, scaffolding supports, wallpaper and workbenches or worktables, small boat storage or construction material and maintenance racks. No nails, screws, miter cuts, or tools are required. The bracket spurs bite into the cross rail, eliminating all side play. The greater the load, the more rigid the sawhorse becomes due to the pincer action of the Stanley brackets.

Made of steel, zinc plated for corrosion resistance, the bracket has a simple hinge construction and hold-fast spur action assures easy assembly and storage. Legs may be folded and left in brackets and fastened together with the cross rail; they make a compact bundle for transportation.

Simple instructions for assembling and plans for a tennis table, picnic table, and picnic bench are contained in a free pamphlet (T 247) offered by the Educational Department, Stanley Tools, division of The Stanley Works.

(For further details encircle index code 1001)

NEW SPATULA TYPE RETRAX TEMPLES

Universal fitting, spatula type, patented Retrax temples are now available on Watchemoket Optical Company's new Rapido Line of custom-fit frames. These new temples supplement Watchemoket's standard smooth hook Retrax temples to satisfy style requirements, eliminate fitting problems, and reduce inventory by making it unnecessary to stock a number of sizes.

The wearer simply slides the spatula ear piece in or out of the temple member for a perfect, comfortable fit. The special design of the earpiece provides an excellent no-pressure grip behind the ear.

All Rapido earpieces — spatula or smooth hook — are made of transparent pink plastic and are available with pink, bronze, copper, maroon, blue-gray or green temples and frames. Transparent clear, pink, or green side shield models are also available with either smooth hook or spatula temples.

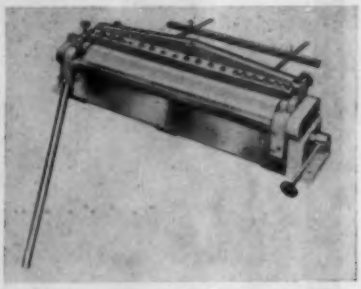
More information available by writing to the manufacturer.

New Spatula Type Retrax Temples

(For further details encircle index code 1002)

"FINGER-TIP CONTROL" FEATURE OF BOX AND PAN BRAKES

Berkroy Products Company have announced their new complete line of 24-in., 30-in., and 36-in. Berkroy Box and Pan Brakes which feature finger-tip control for changing settings.



Berkroy Brake with New "Finger-Tip" Control Feature

Some of the outstanding features of the Berkroy Brakes include: (1) full 1-in. clearance between top fingers and anvil; (2) back gauge range ¼ to 24 in. (30 or 36 in.); (3) removable leaf bar for minimum reverse bends of 3/16 in.; (4) radius-adjusting knobs conveniently located in rear for adjusting radii from 0 in. to ½ in.; (5) thickness-control adjusting knobs permit finger-tip accuracy in adjustment for material thickness; (6) angular control from 0 deg. to 135 deg.; (7) any size box or pan from ½-in. to 24-in. (30 or 36 in.) graduations by selecting various combinations of fingers; (8) size in inches is clearly stamped on each finger; (9) Torrington Needle Bearings for smoothness and accuracy; (10) and maximum box or pan depth, 2½ in.

Write for complete information and brochure on the Berkroy Box and Pan Brakes.

(For further details encircle index code 1003)

(Continued on page 28A)

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Fine tools that encourage Good Work

ARMSTRONG WRENCHES

An ARMSTRONG Wrench feels right—is balanced. It goes over nuts or screw heads easily, grips firmly without sloppiness, won't round corners—because openings are carefully machined to correct sizes. It's safe, strong beyond need without clumsy bulk—because of superior design and selected steels, heat treated to proper degree of hardness and tensile strength. It's quality finished, ARMALOY (alloy steel) Wrenches in chrome plate with heads buffed; HI-TEN (carbon steel) Wrenches in baked-on gray enamel with heads ground bright . . . all plainly marked for size. All are uniformly excellent tools manufactured under strict quality control, by modern methods, with modern equipment in a modern tool plant . . . 1537 different industrial sizes and types—single wrenches, or sets in metal cases, boxes or rolls . . . each a quality tool. Armstrong Wrenches are "Fine tools that encourage good work."

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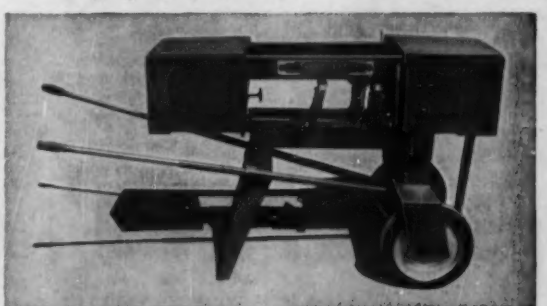

Here's the popular Kalamazoo Model 610 metal-cutting band saw on the handiest chassis you ever saw. Provides greatly increased portability with its rubber-tired 12-inch wheels and telescoping handles. One man shifts the 610 from job to job with ease. Capacity 6" Rounds—10" Flat.

610-D without coolant attachment.
610-W with coolant attachment.
Kalamobile chassis M6A fits all 610 models.

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1259 Harrison St., Kalamazoo, Mich.

SHOP EQUIPMENT NEWS

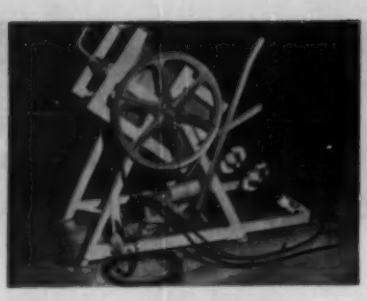
(Continued from page 26A)

NEW CHEMICAL MIXER

The General Scientific Equipment Company announces a new blender. It is ideal for mixing 5-gallon containers of powderless etching additives, such as Micro Mix, Vitasolv, 2N100, and other liquids.

The continuous tumbling action blends chemicals right in their containers. Two infra-red lamps, mounted on the mixer frame, quickly bring contents to the proper temperature.

The mixer is powered by a 115-v. a.c.-d.c., continuous-duty, gear-head motor, with V-belt drive and pulleys.



New Chemical Mixer

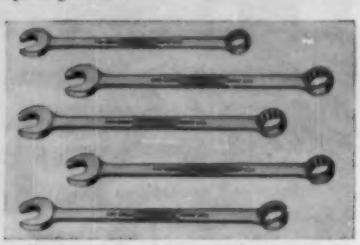
For easy loading and unloading, the mixer is fitted with a belt tension lever, which in the released position allows the basket of the mixer to be manually operated as a tilter for pouring contents directly from the container.

For complete information ask for Bulletin 559 from the manufacturer.

(For further details encircle index code 1004)

LARGE SIZES ADDED TO OPEN END-BOX WRENCH LINE

Induced by the popularity of the open end-box type of wrench, J. H. Williams & Company has recently extended the size range of this line with the addition of $1\frac{11}{16}$, $1\frac{3}{4}$, $1\frac{13}{16}$, $1\frac{7}{8}$, and 2-inch 12-point opening sizes.



The new larger sizes of End-Box Wrenches

These wrenches have exceptional strength for their thin, slim jaws and sleek handles. They are drop-forged from selected alloy steel, heat treated, and chrome-plated over nickel.

Further information available.

(For further details encircle index code 1005)

Train Your Graphic Arts Students

ON CHANDLER & PRICE PRESSES AND CUTTERS

Exactly as Used in Commercial Plants

When you specify Chandler & Price Equipment for your printing department, you can train your students on exactly the same kind of presses and paper cutters used extensively in commercial printing plants. With Chandler & Price your training can cover all essential details of printing press and paper cutter operation.

Chandler & Price Model-N Hand-fed Platen Press Recently announced, the Chandler & Price Model-N press has been widely accepted by schools all over the country. This is a complete press, from floorpan to impression counter. Every operation required on a hand-fed press can be taught on the Model-N, including both color and fine halftone printing. 3 sizes—8″ x 12″, 10″ x 15″ and 12″ x 18″—offer a complete range for any school printing shop.

Chandler & Price Pilot Press—Many thousands of these small presses are in use in schools and other institutions. The basic fundamentals of printing can be taught with this press which does an exceptionally fine job of printing. Chase size 6½″ x 10″. Can be equipped with an ink fountain, if desired. Steel cabinet stand is also available on which to mount press.

Chandler & Price Lever Paper Cutters—This 26½″ lever paper cutter is ideal for school shops. A two-handed safety knife stop is standard equipment. A special safety device can be added, if desired, which requires two-handed operation of the cutting lever. 19½″ and 23″ lever cutters for bench mounting can also be furnished.

Write for complete information. Chandler and Price equipment is fully described in available literature. See your C & P dealer, or write us.

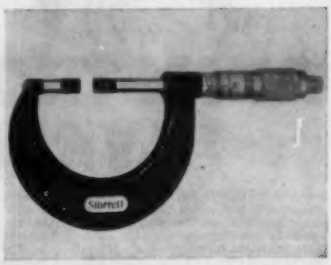
THE CHANDLER AND PRICE COMPANY

6000 Carnegie Avenue • Cleveland 3, Ohio

Manufacturers of dependable printing presses and paper cutters

STARRETT BLADE TYPE MICROMETERS

A line of micrometer calipers with blade-type anvils and spindles is now offered by The L. S. Starrett Company. These new micrometers — Starrett No. 486 Series — are designed to facilitate measuring depths of narrow grooves, slots, keyways or recesses, or for measuring diameters between lands, fins, or ridges such as on circular forming tools.



Starrett Blade Type Micrometer

The blade type anvil and spindle is only .030 in. thick and will measure depths up to 5/16 in. The spindle is nonrotating and will not turn in a slot or roll off a narrow shoulder.

Starrett No. 486 Series Blade Type Micrometers are available in five size ranges: 0-1 in., 1-2 in., 1½-2½ in., 2½-3½ in., and

3½-4½ in. All are graduated to read in thousandths of an inch with every thousandth numbered for quick reading. A convenient "speeder" on the end of the thimble permits rapid turning of the thimble for fast setting and measuring.

Additional information may be obtained from the L. S. Starrett Company. The new micrometers are available through Industrial Supply Distributors.

(For further details encircle index code 1006)

TOLERTON'S NEW GENERAL SCIENCE AND BIOLOGY TABLES

New 2-student tables designed specifically for use in general science and biology were announced recently by The Tolerton Company.

Two-Student Tables for General Science and Biology Classes

Model T-2254 is designed for use in rooms combining general science and biology, where separate facilities for each subject is not available. The unit contains 2 roomy book or storage compartments, 15¼ in. wide by 3⅞ in. high by 18¼ in. deep. The table is of open frame construction with a working area of 22 in. wide by 54 in. long, and is available with black acid-resisting laminated maple top, 1¼ in. thick.

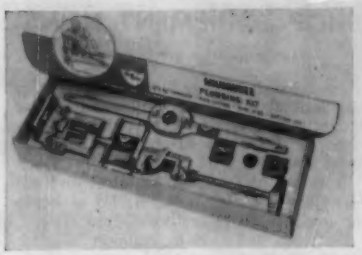
Model TG-2254, also designed for 2-student use, has two open book compartments. Construction is Northern hard maple frame with bolt reinforced mortised-and-tenoned joints. TG-2254 provides a working space of 22 in. wide by 54 in. long. Book compartments are 18¼ in. deep. Black foot sockets, ⅞-in. plastic top or 1¼-in. plastic top are available for both tables.

For complete information write to The Tolerton Company.

(For further details encircle index code 1007)

NEW "MILWAUKEE" PLUMBING KIT

With the entry into the manufacture of Pipe Tools, Milwaukee Tool & Equipment Company also announces the availability of a Plumbing Kit, containing malleable-iron Pipe Threader, malleable-iron Pipe Cutter, malleable-iron Pipe Vise, and Cutting Oil. The kit is designed to serve home craftsmen, farmers, builders, or anyone who does occasional plumbing.



"Milwaukee" Plumbing Kit

Each of the tools is a regular number in the line, bearing the "Milwaukee" trademark of quality. The kit is packaged in a corrugated display carton.

Tools consist of No. P-100 malleable-iron Threader with Dies, threading ⅛- and ¾-in. diameter pipe; No. P-108 "Saunders Type" malleable-iron Cutter, cutting ¼- to 1-in. diameter pipe; No. 850 malleable-iron Pipe Vise handling ⅛- to 2½-in. diameter pipe.

Write for further information.

(For further details encircle index code 1008)

HARDWOOD TRIANGULAR SCALES

Alvin & Company, Inc., have introduced their new seasoned hardwood triangular scales, Nos. 110 and 111 in engineers' and architects' graduations.

The black easy-to-see graduations are clearly imprinted against the smooth,

(Continued on next page)

Whatever the project . . .

AN EARLY START

IS A HEAD START

Enter your talented students in the 1960

FORD iaa

competition now!

How about your students . . . are they preparing for the 1960 Ford Industrial Arts Awards Program? Besides helping support local exhibits for local projects, the Ford IAA offers more than 1,500 national awards totaling $50,000. Ford IAA also presents trophies to schools of first place winners and *awards 32 outstanding students and their teachers with exciting all-expense trips to Detroit.*

Any high-quality industrial arts or industrial vocational project made by students in the 7th through 12th grades is eligible. Send the attached coupon now for the rules booklet.

CLOSING DATES FOR RECEIPT OF PROJECTS ARE

JUNE 10

Salt Lake City—
for projects made in Montana, Wyoming, Colorado, New Mexico and states farther West

JUNE 25

Dearborn, Michigan—
for projects made in all other states

FORD INDUSTRIAL ARTS AWARDS, DEPT. B

FORD MOTOR CO., The American Road, Dearborn, Mich.

I would like to have the official IAA rules booklet and entry blanks. Please send to:

Name_____

Address_____

City_____ Zone____ State____

SEND FOR CATALOG

NAME

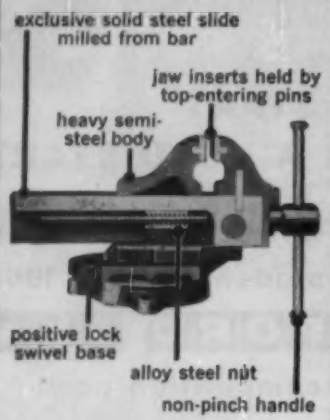
TITLE

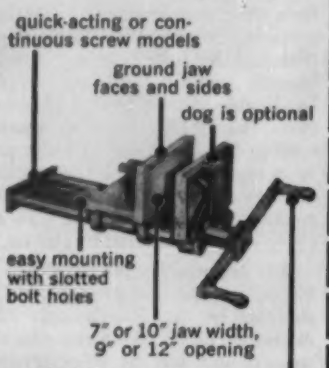
SCHOOL

STREET

CITY/STATE

VISE FEATURES


exclusive solid steel slide milled from bar
jaw inserts held by top-entering pins
heavy semi-steel body
positive lock swivel base
alloy steel nut
non-pinch handle


quick-acting or continuous screw models
ground jaw faces and sides
dog is optional
easy mounting with slotted bolt holes
7" or 10" jaw width, 9" or 12" opening
handle choice: wood, solid or tubular steel

FOR MODERN SHOPS

School shops all over the country standardize on Simplex vises to get extra features. The complete line includes Machinists, Combination Pipe, Sheet Metal, Woodworkers and Drill Press vises. They stand the gaff because they're made better—yet they cost no more.

Desmond Simplex

The Desmond-Stephan Mfg. Co.
Urbana, Ohio

SHOP EQUIPMENT NEWS

(Continued from previous page)

cream-colored, lacquer-finished surface for easy legibility. Full-size profile and regular design, accuracy and dependability are featured in these two 12-in. seasoned hardwood scales.

Scale No. 110 — 12-in. architect divided: 3/32, 5/16, 1/8, 1/4, 1/2, 1, 5/8, 3/4, 1 1/2, 3 in. to the foot. One edge is divided into 16ths.

Scale No. 111 — 12-in. engineer divided: 10, 20, 30, 40, 50, and 60 parts to the inch.

For further information write to Alvin & Company, Inc.

(For further details encircle index code 1009)

NEW POWER TOOL COMBINATION FOR WOODWORKING

Skil Corporation have announced their new power tool combination that can be used as either a high-speed plane or router. The combination unit consists of a 3/4-h.p. router motor, router base, and plane attachment. It is an ideal combination tool for carpenters, builders, and woodworkers.

New Power Tool for Planing

The plane attachment and router motor can be purchased as the Model 296 Router Plane. It is adjustable for bevel cuts inwardly 45 deg., and outwardly 15 deg. Depth of cut is adjustable to 1/8 in., and width of cut is 2 3/4 in.

The Power Tool Used for Routing

The Router Plane features a 16-in. plane shoe with chip deflector; a depth control adjustment which can be made while the unit is operating. In addition, a micrometer adjustment to level the cutter with the rear shoe makes straight, accurate planing easier.

The router base and the motor unit is sold as the Model 297 Router. In addition to many special freehand and pattern decorative cuts, the router can groove, dado, bead, rabbet, mortise, and cove-cut. It is also used with a new Skil hinge butt template kit for fast, accurate door and jamb mortising.

Tools are now available from Skil industrial distributors, or additional information can be obtained from the manufacturer.

(For further details encircle index code 1010)

(Continued on page 32A)

NOW...

SCHOOL SHOP LUMBER WITH GUARANTEED QUALITY

CUT YOUR WASTE FACTOR TO A MINIMUM!

GET MORE USABLE BOARD FEET IN YOUR SCHOOL SHOP LUMBER!

When you buy HARCO lumber, you get *guaranteed quality*—lumber that is guaranteed as to species, seasoning, texture and grade.

You get the kind of School Shop lumber that assures maximum usability and minimum waste.

Our hardwoods grow in the Great Smoky Region of the Appalachian Mountains — America's finest. We accumulate lumber for school shops through a continuing program of texture-selection. We know the quality you need, properly kiln-dry it, and store it for school shop orders.

All lumber is carefully packaged and shipped direct from mill to your school via truck transports.

Get HARCO *guaranteed quality!* Get *more* usable board feet in every order! . . . Let us quote on your requirements.

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BIRCH	MAPLE	WHITE OAK	PLYWOODS

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P. O. Drawer 1091, ASHEVILLE, N. C.

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Two Low Priced Drafting Tables

Drawing top of Master table pivots at front edge — Knee room is constant. Table adjusts from sitting to standing height. Top solid basswood having metal edges.

Gem is low-priced drafting table, hardwood base, solid basswood top. Shipped K. D. in natural state. Described in folders S-8 and S-17. Send for your copies today.

Symbol of MAYLINE Superiority

GEM PEDESTAL TABLE

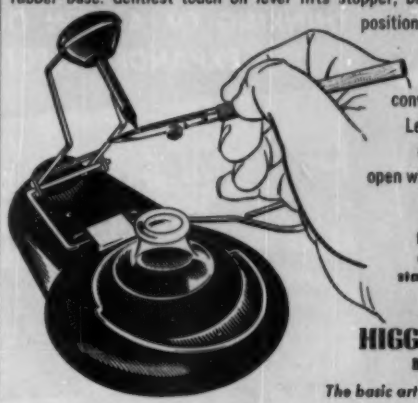
MAYLINE COMPANY
623 No. Commerce St.
Sheboygan, Wisconsin

MAYLINE MAYLINE MAYLINE

FILL RULING PENS FAST WITH ONE HAND!

with new HIGGINS INK-A-MATIC drawing ink dispenser

Just a slight movement of your hand, and HIGGINS new drawing ink dispenser fills ruling pens automatically — faster, easier, than ever before! **SPEEDS UP INK TRACING BY 32%.** Ink bottle sits securely on non-skid rubber base. Gentlest touch on lever lifts stopper, brings pen filler into position. No mess, no waste. Pen filler may be rotated for most convenient filling angle. Lever may be clamped down so bottle stays open when you use dip pen.



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The basic art medium since 1880.

The Stuff Dreams are Made Of!

"Organized Dreaming: . . ." are the two lead words in the title of a fascinating article about designing futuristic models in DUN'S REVIEW, July, 1959. In it are revealed the long term aims that motivate many manufacturers to become product visionaries. The report makes no estimate of the millions of dollars invested annually in "idea" programs. What benefits a company hopes to get out of building and testing futuristic models are disclosed in resumes of the advanced activities conducted by several producers of consumer and capital goods. Although most of the amazing new devices may not be available for years to come, the account nevertheless generates thoughts about how much easier and better life will be in the future as a result of the prototypes dreamed up by industrial designers.

With secondary schools, especially, tending to place greater emphasis on engineering subjects, we can think of no better way to stimulate the creative abilities of students in your Industrial Art classes than by broadening the scope of your course in plastics to include the FIBERGLAS and DYNEL PROCESSES.

Adaptable to an almost endless number of uses, the "glassing" process is simple to work, has a strength that approaches steel, can be applied on metal or any other clean surface that will take paint. Examples of an imaginative application were the four free-form reinforced plastic pavilions at the recent American National Exhibition in Moscow. Consisting of inverted hex-shaped, interlocking umbrellas with a hollow 16 ft. supporting column, its design suggests possible future employment as outdoor shelters, such as, bus stops, food and souvenir stands. No doubt your students could think of other uses, even miniaturizations to meet shop project needs.

In addition to their use in the FIBERGLAS PROCESS, Polyester and Epoxy Resins are also ideal for problems in potting, sealing and encapsulating — the latter a new operation designed to upgrade performance of an electrical unit, for instance, by molding the components into the plastic.

Everything you need to know about the FIBERGLAS PROCESS is explained in our new plastics catalog. Send for your copy today!

SPECIAL OFFER
Polyester-Fiberglas "Cover-It" Kit, or Epoxy-Fiberglas "Starter" Kit, contains the right amount of material for the beginner student, or to experiment with yourself. Kit each.....$3.95
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Make Plastic Tool Handles with TENITE II SCREW DRIVER HANDLE STOCK. Perfect for screw drivers, trowels, gavels, chisels, mallet heads and hand drills. Two styles: Fluted round type, ½" thru 1¼" dia.; smooth round, 1", 1¼" and 1½" dia. Amber transparent color, only.

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SHOP EQUIPMENT NEWS

(Continued from page 30A)

NEW ATLAS 10-IN. BENCH SAW

Atlas Press Company are producing their new Atlas 10-in. Bench Saw which incorporates many special features for greater ease of operation, safety, and longer accuracy life.

It is heavier throughout than saws of similar capacity, with massive cast-iron trunnions, cradle, and saw arm — solid ground steel arbor, and big lubricated-for-life ball bearings — that assure years of dependable service. Both fence and miter gauge are thick-walled, boy-proof aluminum castings — handwheels are cast iron.

The table measures 20 by 27½ in. If a larger work area is desired, grill-type extensions, original with Atlas, can be added to each side to provide a 59½ by 27½-in. table.

Atlas 10-In. Bench Saw

For efficiency and safety the Atlas has double-locking lift-off fence — one movement of lever and fence is anchored in place, or released for positioning or removal; big miter gauge with 8¾ by 2-in. face; miter gauge keyed to table to prevent its falling from front of table; self-cleaning blade control screws controlled through 6-in. diameter handwheels; and see-through safety guard.

For complete information write to the manufacturer.

(For further details encircle index code 1011)

THINKING OF A NEW OR EXPANDED ELECTRIC SHOP?
flexlab electric supply and distribution equipment
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STANDARD
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HERE'S INFORMATION YOU'LL WANT IN YOUR PLANNING

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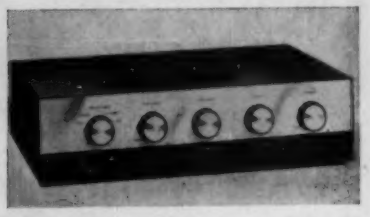
KNIGHT KN-728 STEREO AMPLIFIER

Allied Radio Corporation announce the release of their new Knight KN-728 28-Watt Stereo Amplifier, which provides 28 watts of stereo or monophonic sound, with a peak rating of 56 watts. An im-put-paralleling switch permits instant switching from stereo to 28-watt monophonic operation.



Knight KN-728 Stereo Amplifier

Dual preamp control section features complete control facilities including master volume, single-knob balance, stereo reverse, and rumble filter. The KN-728 has front panel in charcoal brown and gold finish, with case in dark-brown, leather tone.

For more detailed description of the U. L. Approved Knight KN-728 28-watt stereo amplifier write to the manufacturer. It is listed under Stock No. 92 SU 433.

(For further details encircle index code 1012)

NEW MODEL PAPER DRILLING MACHINES

The Challenge Machinery Company have announced two new model Paper Drilling Machines designed to meet the drilling needs of a small shop or duplicator operation.

New Model Paper Drilling Machine

(Continued on page 34A)

FREE! A Complete Plastics Buying Guide for the Instructor

COPE'S CATALOG OF PLASTICS AND CRAFT SUPPLIES

Latest Edition puts the Finest Selection of Plastic Sheets, Rods, Tubes, Liquids, Films — Tools — Findings — Manuals — Project Ideas at Your Fingertips... Includes Money-Saving School Discount Schedule!

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FREE! Step-by-step instruction sheets for distribution to students telling how to make Decorative Fiberglas Bowls and Internal Carvings. Write on school letterhead stating quantity of each you need.

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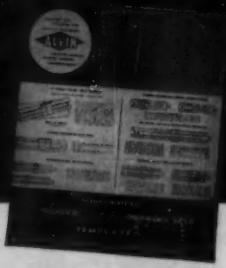
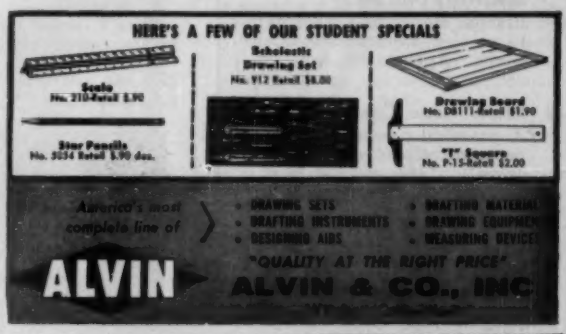
A NEW ALVIN READY REFERENCE CHART WITH DECIMAL TABLE



If you buy or specify drafting materials and drawing instruments, write for this handy Ready Reference Chart with convenient decimal table. Here's a fully illustrated Reference Chart showing the complete Alvin line. Makes a handy buying reference for mechanical and architectural drawing teachers. Can be tacked on a wall for students' reference. For your free copy write to Alvin Today!



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- Electronics (New)
- Fabric Decoration

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SHOP EQUIPMENT NEWS

(Continued from page 32A)

These new models drill up to 2 in. of stock at a time, double that of most competitive models, and will also handle cornering, slitting, and slotting by means of inexpensive attachments.

They are available in two models: Challenge-Climax Model CA, a hand-operated bench model; and Model CF, a stand-type foot-operated model.

Also available are two new, improved, low-cost models in regular Challenge line, models JA and JF.

For more information see your local Challenge Printing Equipment dealer or write to Challenge Machinery Company.

(For further details encircle index code 1013)

REVERSIBLE ⅛-IN. SCRU-DRILL

Black & Decker Manufacturing Company have announced their new double-purpose tool that combines the properties of a drill and power screw driver in a single, hand-held unit.

Reversible Scru-Drill

The "Scru-Drill" can be used with all kinds of bits, including twist drills up to ⅜ in., wood augers to ¼ in., masonry bits up to ½ in., and hole saws from ⅝ to 1¼ in.

(For further details encircle index code 1014)

EICO PREPARES NEW EDUCATIONAL AID

A new educational aid, available to all students of electronics, has been prepared by Electronic Instrument Company, Inc., manufacturers of high-fidelity components, ham gear, radios, and electronic test equipment.

One part of this aid consists of a resistor-capacitor color code, displayed in easy-to-read chart form. The various types of resistors and capacitors are illustrated, with all code markings clearly labeled. Tables giving the values for the color code markings are included for resistors, ceramic capacitors, and molded mica capacitors.

Illustrated in a separate table are various pieces of hardware with which the student of electronics should be familiar. Different kinds of machine screws, hex nuts, spacers, and washers are represented.

The balance of EICO'S new educational aid consists of electronic schematic symbols.

There's an **ELMER'S GLUE** *for every job you do!*

***FREE**—Elmer's Industrial Gluing Chart* tells which is the right glue for every job you do. Elmer's Glue-All, Waterproof Glue, Contact Cements (New Water-Based Non-Flammable or Regular), Plastic Resin Glue, Casein Glue. For your copies of the Chart contact your supplier or write to The Borden Chemical Company, Dept. IA-129, 350 Madison Avenue, New York 17, N. Y.

Borden's Products
FOR THE
HOME HANDYMAN

Each symbol is individually depicted and labeled. With this symbol chart as a handy reference, the student can master the reading of most any electronic schematic.

Copies of this educational aid may be obtained free of charge.

(For further details encircle index code 1015)

THE 1776 "REDIRULE" SLIDE RULE

Eugene Dietzgen Company have introduced their new 15-scale pocket slide rule and genuine leather case with clip.

The 1776 "Redirule" Slide Rule

The 1776 "Redirule" slide rule now provides big-rule design with pocket-size convenience. Made of nonwarping, acrylic plastic with 15 deep-etched scales: K, A, B, T, ST, S, D, DI, and DF, CF, CIF, CIF, C, D, L, it solves almost any conceivable problem.

A handsome, all-leather case with stainless-steel pocket clip protects the rule from damage and insures against loss.

A complete instruction manual is provided.

(For further details encircle index code 1016)

BOICE-CRANE PLANER

A combined chip breaker-deflector, featured on the new 50th Anniversary Model Boice-Crane 12 by 4-in. planer, also forms a complete guard for the cutterhand. Accelerated velocity, effected by flattening the trajectory, causes the chips to accumulate farther back of the work zone, thus precluding roll-in of chips, and blemishing of the finished surface of the lumber. There is less need for a dust-collector system, but if one is connected the installation is greatly simplified by the new design. Removal of only two screws detaches the deflector guard for blade changing or jointing.

Boice-Crane Planer

Another designed-in feature is linkage between the spring-loaded infeed-roll journals and the chip breaker which, on heavy cuts, makes the work feed's initial lumber pickup automatic, rather than manual.

Write for a copy of the brochure on this new planer.

(For further details encircle index code 1017)

"MAKE COLOR YOUR BUSINESS — WITH THE EKTACOLOR SYSTEM"

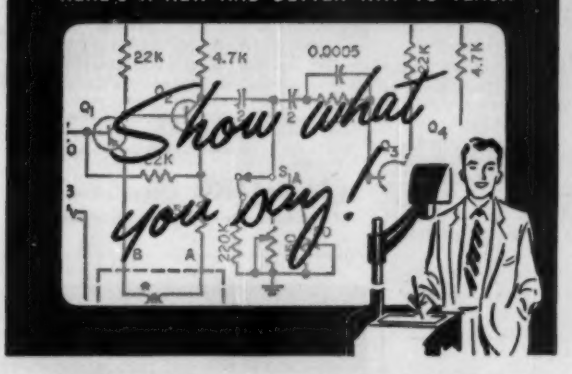
Eastman Kodak Company have made available prints of the popular new motion picture, "Make Color Your Business — With the Ektacolor System." The new picture explores the applications of the color-negative process to the fast-expanding markets for color photography .

The 16-minute, 16mm. color and sound informational film examines the color photography field and outlines areas in which the Ektacolor system can be most profitably employed. It is available on free loan for showings to professional and commercial photographer groups.

A striking example of color photography in itself, the new motion picture opens with emphasis on the increasing role of color in advertising and packaging. It cites the versatility of color negatives; demonstrates their use in producing direct color prints, dye transfers, and transparencies; and shows how Ektacolor Paper lends it-

(Continued on next page)

HERE'S A NEW AND BETTER WAY TO TEACH



With The New **VU-GRAPH** Overhead Projector

It's unique! Beseler's new VU-GRAPH is the projector you use in a fully lighted room. The picture flashes OVER your head—onto the screen—while YOU face the class to see who understands, who needs help. Use prepared transparencies or quickly make your own. VU-GRAPH projects in black and white or full color: slides, stencils, models, even your own writing—as you write!

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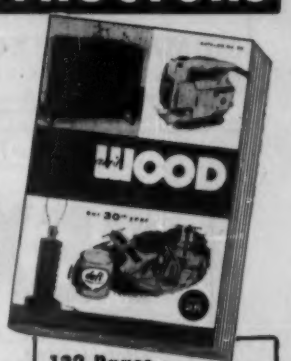

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132 Pages —

- . . . many in full color . . . newest project ideas
- Embossed mouldings, carved ornaments, matched plywoods and veneers
- Complete lines of archery and upholstering supplies
- New! Blanks for baseball bats, snow skis, complete water ski kit
- New! Clock kits, Swiss music movements, Hi-Fi Cabinet woods.
- "Deft" all purpose finish
- Same day shipment; guaranteed satisfaction

The chisels, gouges and V tools in above illustrated set, have been especially selected for their usefulness to the student in wood carving and sculpture, who desires a set of basic tools.
This set of 12 tools, highly polished, with round handles attached, ground sharp — need only honing for lasting keen edges, supplied in an attractive and individual spaced carton, cost only **$19.50**
This is an inexpensive set of high quality carving tools.
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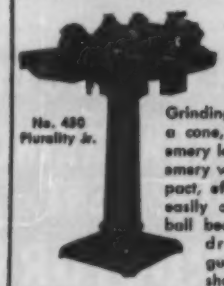


NOW AVAILABLE IN 3 SIZES
No. 425 Plurality Sub Jr.
No. 450 Plurality Jr.
No. 475 Plurality

Grinding can be done on a cone, coarse or fine or emery leather stropping or emery wheels. Unit is compact, efficient, serviceable, easily accessible and has ball bearing direct motor drive. Especially guarded for school shop use. Details on request.

MUMMERT-DIXON CO.
HANOVER, PENNSYLVANIA
Originators and Pioneer Manufacturers of Oilstone Tool Grinders

SHOP EQUIPMENT NEWS

(Continued from previous page)

self particularly to darkroom techniques which improved the finished print.

For further information on securing prints of the film, write to Audio-Visual Service Department, Eastman Kodak Company.

(For further details encircle index code 1018)

NEW BESELER STARTER KIT

Charles Beseler Company have made available to users of Vu-Graph Overhead Projectors their new Beseler Starter Kit which provides every modern audio-visual tool for professional, dramatic illustrations, vital to lectures, teaching, and sales presentations.

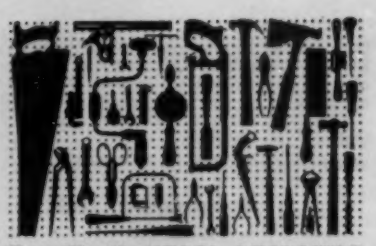
The Starter Kit contains a complete selection of tools and materials for quick, simple, and attention-compelling illustrations of every point on which emphasis is desired. Illustrations can be in black and white, or in dramatic color for special effects.

Beseler Starter Kit

The Beseler Starter Kit is easy to use; it requires no special skill or training, no added expense. It includes acetate sheets, mounts, special film, tape, Vu-Graph pencils, cleaners, inks, colored adhesive sheets, brushes, tracing pad, and an assortment of items for an infinite number of visual effects. The kit is offered in a heavy-duty leatherette covered case with hinged drop-front, that serves as a permanent protective transparency case.

Please write for additional information.

(For further details encircle index code 1019)



New Plastic "TOOL SHADOWS" show where tools belong

TOOL SHADOWS are full-size plastic die-cut silhouettes of the 68 basic hand tools. Backed by a special pressure-adhesive, they stick to any surface. They organize a workshop, make it look neat and dressed-up. They prevent tools from getting lost by showing where each tool belongs and when one is missing. Complete set of 68 (red or black) only $2. No COD's or open accounts. Please send check with order. Money back if not delighted. SHADOWS, 109 East 81 St., New York 28, N. Y.

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Protect your students' clothing with economical shop aprons. Choice of colors. Used in schools coast to coast!
Instructors' coats — 2 distinctive styles, expertly tailored, top quality material. Choice of 5 colors.
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A NEW 24" x 16 Gauge Capacity Machine with many PEXTO exclusive features.

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New 4-color catalogue offers dozens of challenging "do-it-yourself" items

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(For more information from advertisers, use the postcard on page 32A)

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HIGH TEMP. KILN
Temperature to 2350° F.
HEAVY DUTY

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Fast come-up time 5 hrs. to 2300° F. 7" of insulation, including interlocked 2500° F. brick. Controls grouped in eye-level panel, recessed with special plexiglass cover to prevent unauthorized adjustment while in operation. Many other features.

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HARGRAVE
The Complete Line of Tested TOOLS

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CHISELS AND PUNCHES

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FOR SAFETY AND LONGER LIFE
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Descriptive Material . . .

ELECTRONICS CATALOG

Allied Radio Corporation announces the fall release of its new 1960 Catalog No. 190, featuring a large selection of electronic parts and equipment for use in schools, classrooms, laboratories, and shops. This edition consists of 444 pages, which includes 232 pages in rotogravure and 4-color covers, and lists over 40,000 items.

There is a greatly expanded section on training kits, recording and test equipment, books, diagrams, parts and tubes, and other equipment required for radio and electronic training activities.

The 1960 line of 70 Allied Knight-Kit electronic kits — instrument kits, high-fidelity kits, ham gear and hobbyist kits — is illustrated and described in 2-color rotogravure.

Another 2-color rotogravure section is devoted to sound equipment.

Complete data is arranged in easy-to-follow style, including a full presentation of the latest stereophonic high-fidelity equipment, the latest tape and disk recorders, selections of TV accessories, phonographs, communications receivers, photoelectric equipment, fluorescent fixtures and lamps.

(For further details encircle index code 1020)

GENERAL SCIENTIFIC EQUIPMENT COMPANY CATALOG

The new 24-page catalog No. H-459 is now available, covering Polyethylene, Polypropylene, Polyurethane, and Polyvinyl Plastic Laboratory Apparatus.

Laboratory ware made from these materials is lightweight and is highly resistant to chemical attack. Over 100 products are illustrated and described. Technical properties are discussed in their relation to this development.

Catalog available without obligation from the manufacturer.

(For further details encircle index code 1021)

NEW SAMS BOOK

Basic Electricity and an Introduction to Electronics (VEY-IT), 176 pp., 8½ by 11 in., 317 illus., $3.60.

This new reference-text, authored by the Sams engineering staff, has been specifically designed for instructional use in secondary schools, vocational-technical programs, and technical and trade institutions. However, service technicians and hobbyists will find this volume an invaluable aid for the self-study of electricity and electronics.

This complete basic text covers: wire and wireless communication, electrical power distribution, heating and lighting, residential and commercial wiring, industrial electricity, radiology and electrochemistry, service and industrial electronics.

A special Introduction to Electronics section presents the theory and circuit applications of modern electronic components as found in the home, industry, and the field of communications. Medical applications, automation, data processing, and basic military applications are also featured.

Sold by electronic parts distributors and bookstores throughout the country, or available from Howard W. Sams & Co., Inc.

(For further details encircle index code 1022)

(Continued on next page)

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Modern Wood Finishing
with the famous
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PROCESS
The "Wipe-on" Finish that
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- Requires no brushes
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MANY OTHER PRACTICAL ITEMS based on the advice of hundreds of teachers

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New Catalog of fresh ideas

for project activities in plastics, ceramics, leather, wood, metal.

Handsome desk and project accessories — desk fountain pens, desk balls pens and pencils, swivel-funnel-holders, plus many new items!

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Complete stock of lamp parts for your lamp projects shown in our catalog. Also contains charts and instructions for building and wiring lamps. These valuable instructions and catalog sent for 25¢.

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MACHINE TOOLS
METALCRAFT TOOLS
METALWORKING TOOLS
METALS
PORTABLE ELECTRIC TOOLS
PRECISION TOOLS
SHEET METAL EQUIPMENT
WELDING EQUIPMENT

PATTERSON BROTHERS

Descriptive Material . . .

(Continued from previous page)

L-W CHUCK COMPANY CATALOG

A new catalog on vises, chucks, and dividing heads has just been published by L-W Chuck Company.

In it are described and illustrated a full line of milling machine and drill press vises, dividing heads, and attachments, and lathe and magnetic chucks, demagnetizers, and rectifiers.

Free copies are available upon request.

(For further details encircle index code 1023)

CARE AND TREATMENT OF PARENT WOOD TOPS

Parent Metal Products Company has just released a 4-page booklet entitled "Care and Treatment of Parent Wood Tops." This booklet shows how atmospheric and weather conditions can affect your wood tops and how to overcome these natural deficiencies.

Free copies of this booklet are available upon request.

(For further details encircle index code 1024)

Personal News from Industry . . .

CHANDLER & PRICE ELECT NEW PRESIDENT

Walter P. Moak has been elected president of Chandler and Price Company to succeed D. W. Frackelton who passed away June 24, 1959.

J. W. Kirkpatrick and F. D. McLaughlin were elected vice-presidents.

CHANGES IN EXECUTIVE GROUP

The Columbian Vise & Mfg. Company, Cleveland, Ohio, recently announced two changes in its executive group, following a meeting of the firm's board of directors.

H. F. Seymour, president since 1945, was elected chairman of the board.

Dan C. Swander, Jr., formerly executive vice-president, becomes president.

SAXCRAFTS APPOINTED DISTRIBUTOR FOR NEW "LITHO-SKETCH" PROCESS

Saxcrafts, Division of Sax Brothers. Inc., Milwaukee, Wis., distributors and dealers in art and craft supplies, have been appointed exclusive national distributors for "Litho-Sketch," a revolutionary new method of making lithographs from paper plates. The product itself is patented and manufactured by Anthony Ensink & Company, of Chicago.

LUMBER FOR SCHOOLS

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For SCHOOL PRINT SHOPS

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TEXTBOOKS

METALWORK ESSENTIALS

By F. E. TUSTISON and R. F. KRANZUSCH

Basic text in metalworking for beginners covering the essential bench processes. Hand-tool manipulations, cutting, shaping, forming, fastening, and finishing the common metals. $2.50

INSTRUCTIONAL UNITS IN MACHINE SHOP

By OSCAR A. EMBRETSON & HENRY J. SEYMOUR

Twenty instructional units that represent a really thorough training in the fundamentals of machine shop work as far as job operations are concerned. Paper, 96 cents

METAL SPINNING

By JAMES E. REAGAN and EARL E. SMITH

Revealing the trade secrets of a little known craft, this presentation put the fine arc of metal spinning within the comprehension of students in school shops. $2.25

MACHINE SHOP TECHNOLOGY

By C. A. FELKER

Technical information on hand and power tools, applied mathematics, and blueprint reading problems for skilled performance in the field. Content in most cases is organized in units covering required skills. $4.80

ARTISTIC METALWORK

By A. F. BICK

Designed for school shops with limited equipment. Presents precise, easy-to-follow, and carefully diagrammed information for making lamps, bowls, vases, etc., which are both artistic and useful. $4.50

Joseph Kaberlein Sheet Metal Series

TRIANGULATION SHORT-CUT LAYOUTS

Practical, modern methods for laying out and forming patterns used for blower exhaust systems, heating, and air conditioning. $5.50

AIR CONDITIONING METAL LAYOUT

Up-to-date methods of laying out square, rectangular, and round ducts used in heating, ventilating, and air conditioning. $4.75

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Practical and modern methods for laying out and forming patterns for round elbows, angles, T's, offsets, tapers, etc. $4.75

WELDING

ARC WELDING

By CHARLES H. ZIELKE

This fine book covers all the fundamentals with technical terminology and detail reduced to a minimum — tools, terms, basic types. Also contains job lessons. Paper, 80 cents

ELEMENTARY AND APPLIED WELDING

By CHRIS H. GRONEMAN & HERBERT P. RIGSBY

Elementary welding-project book describing all beginning techniques of oxyacetylene and electric arc welding. $2.40

PIPE FITTER'S AND PIPE WELDER'S HANDBOOK

By THOMAS W. FRANKLAND

Pocket-sized reference containing the information needed by tradesmen in the field. Recently revised. $1.50

PROJECTS

MODERN WROUGHT IRON FURNITURE

By NED FRISBIE

Forty widely varied projects in wrought iron suitable for classes in welding in high schools and for adult-education handicraft courses. $2.80

FUN WITH METALWORK

By J. W. BOLLINGER

New metalworking book! Furnishes a wealth of projects that are fun to create: silhouettes, lamps, household conveniences, etc. Fully illustrated. $4.75

METALWORKING MADE EASY

By WILLIAM J. BECKER

Simple metalworking projects for the beginner, emphasizing fundamentals — sheet metal, art metal, and ornamental iron. Illustrated, list of tools. $2.50

101 METALWORKING PROJECTS

By L. C. PETERSEN

Each project includes a complete working drawing, description of tools, equipment, and material required, and detailed directions. $2.75

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By W. BEN. HUNT

Covers the craft completely and interestingly. Projects include bracelets, rings, buckles, etc. Full descriptions of tools and techniques, and many illustrations. $5.50

WOOD AND ART METAL

By HAROLD O. AKESON

32 simple but distinctive projects in copper, brass, aluminum, pewter, wrought iron, and a clever combination of wood and metal. Fully illustrated. Paper, 85 cents

TIN THINGS WE LIKE TO MAKE

By SHERMAN R. COOK

Sixty-seven superior quality projects from scrap tin or tin cans. Objects are of practical and decorative value. $2.75

55 NEW TIN-CAN PROJECTS

By JOSEPH J. LUKOWITZ

Projects for making 55 attractive and useful objects or discarded tin cans with a minimum of difficulty. Paper, 90 cents

ORNAMENTAL TIN CRAFT

By CHRIS T. GRONEMAN

Shows how sturdy ornamental tin-craft articles can be made of heavier material produced by sweating together pieces of sheet metal salvaged from tin cans. Paper, $1.65

HAND-WROUGHT IRONWORK

By EDWARD F. KROM and PETER J. PAIGE

Fifty projects in lamps, wall brackets, lanterns, doorknockers, etc., within the range of elementary and high school students. Fully detailed and illustrated. $3.25

WORKING WITH ALUMINUM

By DOUGLAS B. HOBBS

Unusual articles can be made in the school workshop from these 25 aluminum projects involving basic metalworking processes. Fully described and illustrated. $2.50

SIMPLE BRACELETS

By J. W. BOLLINGER

Over 150 designs for making simple bracelets from a variety of mental that include stainless steel, aluminum, pewter, etc. $2.50

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